CAUSAL THINKING, ADJUSTMENT AND SOCIAL PERCEPTION AS A FUNCTION OF BEHAVIORAL SCIENCE CONCEPTS IN ELEMENTARY SCHOOL CHILDREN

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CHAPTER I

STATEMENT OF THE PROBLEM

Introduction

Clinical psychologists have long been involved with the question of mental health and more specifically, with efforts to eradicate emotional disturbance and to facilitate the positive growth of the human personality. These efforts have been for the most part restricted to the intensive personal interaction involved in both individual and group therapy, and to the more extensive manipulation of the social environment.

The present study was designed to examine the possibility of utilizing yet another method to develop mental health—the use of a didactic or teaching approach on a group basis with children at an early and impressionable stage of development. It was planned to test whether the direct teaching of a course in behavioral science would aid in developing in the children the cognitive element, causal thinking, and at the same time certain personality variables recognized as enhancements of the personality and as deterrents to maladjustment. Further effort was made to ascertain whether certain social factors might influence the receptivity to and development of causal thinking in the elementary school children.

The question of utilizing public school education as a method of promoting mental health has long been the concern of educators (1-6). It is

only recently, however, that psychologists have begun to attend to its potential value in this regard (10, 52, 53).

Educational-Psychological Foundation

The actual introduction of behavioral science in education can be traced to William James. Prior to that time, however, educators such as Rousseau and Pestalozzi had done much to create an atmosphere in which education was seen not only as the inculcation of cognitive elements but as the development of the entire personality and as a vital preparation for human interaction. As a contemporary of James, John Dewey taught that social studies rather than the classics ought to be the core of education and advocated that problem-saving methods be applied in democratically structured classrooms. He was, furthermore, highly influential in sensitizing teachers to the needs and motivations of their pupils.

William James, himself, in 1892, accepted the Harvard Corporation's invitation to give public lectures to teachers. In sharing with them over the years his thoughts on child psychology, he tried to impart a sympathetic conception of the mental life of pupils. He suggested restructuring the emphasis of education by focusing on the child rather than on the subject matter: "You [teachers] should regard your professional task as if it consisted chiefly and essentially in training the pupil to behavior; taking behavior, not in the narrow sense of his manners, but in the very widest possible sense, as including every possible sort of fit reaction on the circumstances into which he may find himself brought by the vicissitudes of life" (19, p. 3).

At about the same time, the education community was also influenced by the serious public concern over the menace of veneral disease which eventuated in the organization of the American Social Hygiene Association with Charles W. Elliot of Harvard as its first president (7) and the advocacy of sex instruction in the schools. Although narrowly focused, this activity appears to have set the precedent for using the resources of the schools to grapple with serious social problems. A movement to use the schools for "Character and Citizenship" training followed. The "Mental Hygiene" movement also quickly focused on the contribution which should or could be made by the schools and numerous programs of mental hygiene in the schools continue to be advocated. One of the more ambitious of these programs, that of the human relations classes, developed from the work of Bullis (11). Concern over religious and racial intolerance following World War II gave impetus to a strong "Inter-group Education" movement in the late 1940's.

The advent of psychoanalysis also exerted an important early influence on the behavioral science aspects of contemporary education (16). According to Symonds (51), Oskar Pfister, a Swiss teacher, was the first to have proposed modifications in educational practices based on psychoanalytic principles. Since then, analysts and other psychotherapists, such as Low, Adler and Rank, have argued strongly for school acceptance of some responsibility for the emotional well-being of their students. Anna Freud's book Psychoanalysis for Teachers and Parents deals in part with what should be taught to a child concerning his own development, and stands as a landmark in this movement.

It was at the University of Iowa that research-minded psychologists first manifested an interest in behavioral science instruction in

the public schools. Butler (12), in 1934, studied the effect of an instructional program in child development and family relationship on 1,586 high school students, and concluded that they made significant gains not only in knowledge, but also in self-reliance as measured by an attitude scale. Since 1941, Ralph Ojemann and his associates at Iowa (18, 22-27, 29-45) have carried on a continuous research program on education in human relations and mental health, with special emphasis on the axiom that behavior is "caused." The program itself was planned with the specific intent of inculcating or developing a causal orientation in the elementary school children. This causal orientation was defined by Ojemann as an understanding and an appreciation of the dynamic, complex and interacting nature of the forces that operate in human behavior. It involves an attitude of flexibility, of seeing things from the viewpoint of others, as well as an awareness of the probabalistic nature of knowledge. A causally oriented person is described as capable of suspending judgment until sufficient factual information is available; furthermore, he realizes that his behavior has consequences and that there are alternative ways of solving social problems. This is immediately contrasted with so-called "surface-thinking" in which there is either no concern for an awareness of the dynamics of human behavior or there is habitual recourse to pseudo-causal approaches, viz. mystical or magical explanations of behavior, or overgeneralized observations and similar untested assumptions (stereotyping, labeling, rationalizing, etc.). It is thought further that a person who is aware of the dynamics and causal nature of human behavior is better able to solve his own problems and to meet social situations adequately.

The Iowa project involves no specific intent to introduce new subject matter as such into the school curriculum. Rather the intent

is to restructure the existing curriculum of Social Studies, English, Mathematics, etc. so that it is causally oriented throughout and so that it is taught by a causally oriented teacher beginning in the early years. To achieve this, the Iowa project (50) developed a one-month intensive training program for selected elementary school teachers which includes several units: (1) Developmental problems of the normal child (3 hrs./wk.), (2) Personal problems of everyday life (5 hrs./wk.), (3) Action research in the classroom (2 hrs./wk.), (4) Causal approach to an understanding of human behavior (2 hrs./wk.), (5) Meeting classroom problems (3 hrs./wk.), (6) Practicum in preparation of special material (2 hrs./wk.). In addition, there was developed a causally oriented integrated curriculum at three age levels; primary, intermediate and secondary.

Examples of experiences provided at the primary level include: (1) demonstrations furnished by the teacher's behavior as she handles day-to-day social situations that arise in the classroom and on the playground, (2) use of narratives which contrast "surface" and "causal" thinking, providing vicarious experiences for the class, (3) use of expositions to help the child understand and appreciate the work of the teacher and other persons with whom he interacts directly. Examples of experiences provided at the intermediate level include (1) the behavior of the teacher, (2) teaching causally oriented social studies, (3) extending stories already available in traditional textbooks and readers with causally oriented discussions, (4) discussion of human behavior in health education materials, (5) use of room councils as a laboratory for applying the understanding of behavior dynamics to "real" situations.

Examples of experiences at the secondary level stress the causal orientation of the presently existing curriculum. Social studies area

is to be based on a study of the forces operating in the behavior of the people involved; study of English literature can be made an adventure in gaining more insight into the feelings and other factors that operate in human striving. It is hoped that through these exposures a student can learn more about applying the knowledge of human development to the guidance of his own growth.

Various studies from the Ojemann project have demonstrated to some degree that participation in an experimental learning program for both teachers and pupils designed to develop an understanding and an appreciation of the nature of human behavior and the dynamic factors operative in social situations, does substantially increase knowledge of social causality (28, 31, 35, 44, 50). Stiles, for example (50), investigated changes in the method used by fourth, fifth and sixth-grade children in handling daily behavior situations brought up for consideration in the "room council" and found that the causal learning program produced significant changes in the direction of decreased punitiveness and toward more concern with understanding before deciding.

Muuss (31) matched 25 subjects who had participated in the causal learning program for two years with 25 subjects who had been in the program for one year and with 25 subjects from the control group who had not participated on I.Q., sex and grade. The two-year trained subjects showed a significantly greater gain than the one-year trained subjects on the Problem Situation Test (a measure of the tendency to use immediate punitiveness), on the Children's Anti-Democratic Scale (CADS), and on the certainty scores of a test for intolerance of ambiguity.

Ojemann et al. (45) utilized 19 children in each of four experimental classes (one fourth-, one fifth-, and two sixth-grade groups) and

four control groups of 25 pupils each. The experimental groups made significant changes in their causal orientation after participation in the Causal Learning Program as measured by a Causal Test developed by the Iowa project to tap the child's awareness of the complex variable nature of human behavior.

A more recent study by Ojemann and Snider (44) utilized a causally-oriented behavior observation form in the hands of trained independent observers to study the changes in observed behavior in the direction of causality appearing after the administration of Ojemann's teaching program. The subjects were 206 fourth-grade pupils in four classes (106 in experimental and 100 in control group) and 212 fifth-grade pupils in four classes (99 in experimental and 113 in control group). With inter-observer reliability of .67 to .69, the results indicated that two of the four fourth-grade groups showed significant gains over their respective controls at the 5 per cent level of confidence while three of the four fifth-grade groups showed significant changes over their respective controls at the 1 per cent level of confidence.

Somewhat related to the Ojemann project is the recent work of Ronald Lippitt and his associates at the University of Michigan (25). Lippitt asserts that "the young child, immersed in a complex social culture, constantly required to interact wisely with his classmates, his older or younger siblings, his parents, his teachers and other adults, has a pressing need to develop an understanding of social processes and to perfect interpersonal skills" (25, p. 2). To fulfill such a need, Lippitt and his associates at the Institute of Social Research, University of Michigan, initiated a program which involves: (1) training present

social study teachers in an appreciation and understanding of the dynamics of human behavior, (2) developing and incorporating into the already existing social studies program of the elementary school, brief teaching units such as "Getting work done together in small groups," "Angry feelings," "Learning from Groups," (3) complementing the didactic presentation with behavior specimens or role-playing episodes in the classroom that allow the children an active observation of and participation in psychological and social process phenomena, (4) allowing supervised field work of the older children with the younger in a helping relationship, primarily educational. At the present time, continual evaluation of this approach yet to be published, is in effect.

The findings reported above supported not only the Iowa project and by extrapolation the similar Michigan project but suggested the present study—a modified approach to changing attitudes, less elaborate in structure, more easily recorded and replicated, more in line with educational tradition (and hence more easily introduced into the school curriculum), and more appropriate to causal orientation or thinking. This would consist in a course in behavioral science—an already available subject matter including the disciplines of psychology, sociology and anthropology, concerned with human behavior, and embodying the "causal" attitude.

It was planned to work with fourth-grade school children as a young group to whom Ojemann's experience would be pertinent. If this approach is equal in results to that of Ojemann, it has the advantage of being more easily introduced into the curriculum and into teacher-training. Traditionally education has been slow to respond to mental health projects such as those devised by Ojemann. Ojemann himself has

worked on his planned program since 1949 and it is safe to say that acceptance has been somewhat slow. The tradition of education has been to introduce new subject matter from the top down as it is demanded by society, or as educators can convince society of its value (15). If the findings warrant, the introduction of behavioral science as a body of knowledge may be accepted as a part of the existing trend to experiment with bringing college level subjects to the young child.

It was expected that participation in the class in behavioral science by the fourth-grade children, would result in an increase in causal thinking because of both the children's previous exposure to physical causality in other subject areas, and the very framework of behavioral science and its concepts which are patterned after the physical sciences, and thus causally oriented. In our culture, it is understood that a causal approach is taught toward the natural science phenomena. However, there is no basic dichotomy between social and natural phenomena. The causal question: "Why does a given phenomenon occur?" is involved in both areas. Therefore, there is justification in hypothesizing that an experimental teaching of behavioral science which is patterned after the natural sciences and which is designed to teach principles of human behavior, will foster a causal orientation in elementary school children (14).

In addition, we expected to capitalize on both the interpersonal behavior of the behavioral science teacher himself who not only conveys the behavioral science concepts through a didactic, teaching approach but also through his own approach to and relationship with the children in the classroom which exemplifies in action the entire causal orientation, and the interpersonal behavior of the children's actual fourth

grade teachers who would be present during the class presentation, who would assimilate the behavioral science concepts and the behavioral science teacher's orientation to the children, and who would relate correspondingly to the children for the remaining week in the light of this experience, thereby reinforcing this causal experience of the behavioral science class.

Such a program of teaching behavioral science to elementary school children had formerly been initiated in a pilot project by Dr. Sheldon Roen (47). The fourth-grade class used, however, was a group of intellectually very superior children (130 I.Q. and above) and evaluated by an achievement test only at the end of a five-month teaching period with one class per week. The present study will investigate whether participation in a behavioral science class is conducive to growth in causal thinking in the average fourth-grade pupil. Thus we state our first hypothesis:

1. Exposure to and participation in a class in behavioral science will foster significant growth in causal thinking in fourth-grade school children.

Causal Thinking and Mental Health

Beyond the intellectual value of growth in conceptual thinking, it seems that a person who is aware of the dynamic and causal nature of human behavior is better able to solve his own problem and to meet social situations adequately. For example, lack of insight into the dynamics of one's own behavior and an unwillingness and/or an inability to understand the problems and the behavior of others tend to increase the level of anxiety and the degree of insecurity. If other people's behavior is not understood, it will tend to be threatening as are physical events

which an individual experiences and does not understand. A lack of insight into the dynamics of behavior will tend to make it difficult to react logically to the behavior of others. Furthermore, if behavior is not understood, it may be misinterpreted and the individual may react in such a ways as to produce a threat to the other person's security and self-respect. This, then, may well generate conflict which would add further to the difficulty of the situation. If at that time the person does not understand his own behavior and the factors that influence him he is likely to feel threatened, insecure and anxious. Evidence is available to substantiate some of these contentions, at least in part.

In the previously cited Ojemann study (45), there was discovered a significant difference between the experimental and control groups on the Problem Situation Test designed to measure punitiveness. The more causal subjects were less ready to use immediately punitive measures. These results take on added significance when it is recalled that Lyle and Levitt (26) showed that "high scorers" on the PST gave significantly more extra-punitive responses on the children's form of the Rosenzweig Picture Frustration Test. Also, the "highs" were more frequently ego-defensive in their responses.

Another study by Levitt (22) compared causally trained and control groups at the fourth-, fifth-, and sixth-grade levels on the Children's Anti-Democratic Attitude Scale (CADS). The causally trained groups showed significantly lower authoritarian scores at all three grade levels as opposed to the control groups.

A later study by Muuss (31) found significantly lower Anti-Democratic scores on the CADS in high causally oriented subjects when compared with low-causally oriented subjects.

Muuss (30), using a perceptual test consisting of a sequence of unfinished pictures, demonstrated that high-causally oriented subjects have more tolerance toward ambiguous stimuli. They tend to guess later, make fewer guesses, and express less certainty when asked to guess what the final picture is going to be. The causally oriented child may make a guess but he is more inclined to do so in terms of probability, and is aware of the tentative hypothetical nature of his response. Muuss also found (30) that high-causally oriented subjects are more likely to reject verbal statements indicative of intolerance of ambiguity.

Muuss (31), using a group of 88 high-causally oriented subjects and 66 low-causally oriented subjects from a group of 280 sixth-grade children, found significant differences on the Kooker Security-Insecurity Scale. Muuss also found a significant difference in a similar group at the fifth-grade level.

Significant differences were also found in scores on the Children's Manifest Anxiety Scale at both the fifth- and sixth-grade levels. The high- and low-causally oriented subjects were also different significantly on the built-in "lie" scale of the Children's Manifest Anxiety Scale.

Bruce (9) reported that sixth-grade pupils with high self-ideal discrepancy scores who had been in the causally oriented program for two years evidenced significantly less manifest anxiety on the Children's Manifest Anxiety Scale than control subjects with equally high self-ideal discrepancy scores. In other words, it appears that the usual finding that high self-ideal discrepancy scores are associated with high manifest anxiety scores has to be modified. It appears to hold only for subjects low in causal orientation. A growth in causal orientation might change this relationship.

It will be noted that in the available research on the relationship between causal orientation and selected personality variables:

(1) the emphasis was primarily on the negative, and at time, global aspects of personality, e.g. insecurity, anxiety, anti-democratic attitude.

(2) the focus rested primarily on the intra-psychic phenomena as opposed to the inter-psychic or social interaction.

(3) most studies limited themselves to the fifth and sixth grade levels of elementary school.

The present study will attempt to determine the nature and extent of the relationship, if any, between causal orientation or thinking and both certain positive and more specific aspects of personality, and certain inter-personal phenomena, and will also extend the study to slightly younger children.

As noted previously, causal orientation is defined as an awareness of the dynamic complexity of human motivation and an understanding of the interacting nature of the forces that operate in human behavior and in social situations in general. If this be the case, then we might well think that there would be developed at the same time the ability to see things from the viewpoint of others, a realization that one's behavior has consequences and that there are alternative ways of solving most social problems that necessitate in turn, interaction with others. This description would seem to contain characteristics which are characteristic of democratic behavior, to wit: cooperation (individual is adaptive, conformative and helpful in dealing with others), friendliness (individual has an attitude of "right-doing" toward others, is sympathetic and tactful), integrity (individual has a sense of justice and practices fair play), leadership (individual has initiative, inventiveness, understands

people and is constructively critical), responsibility (individual is dependable, efficient, prompt, self-reliant, controls his own behavior and has patience and perseverance). From these considerations arose the second and third hypotheses:

2. There is a significant and positive relationship between causal thinking and democratic behavior which is a composite of several secondary characteristics, each of which is in turn, significantly related to causal orientation.

3. Exposure to and participation in a behavioral science class will foster significant growth in democratic behavior among fourth grade children.

Further, it can be thought that to the extent that an individual acquires a dynamic awareness of the complexity of human motivation and an understanding of the interacting nature of the multiple determinants of behavior, to that extent he acquires a flexibility in thinking. He learns to suspend judgment until sufficient information is available (in part related to an increased tolerance of ambiguous stimuli demonstrated by Muuss)(30). In short, he increases in what is described traditionally as "critical thinking," the ability to weigh evidence, to deliberate carefully, free from debilitating emotional elements. The school prizes this as one of the most valuable transfer effects that needs to be fostered within every subject area itself. From these considerations arose the fourth and fifth hypotheses:

4. There is a significant and positive relationship between causal thinking and critical thinking.

5. Exposure to and participation in a behavioral science class will foster significant growth in critical thinking among fourth-grade children.

Further, it can be reasoned that poor insight into the dynamics of one's own behavior and an unwillingness and/or an inability to

understand the problems and the behavior of others tend to increase the level of anxiety and the degree of insecurity. If other people's behavior is not understood it will tend to be threatening. A lack of insight into the dynamics of behavior will tend to make it difficult to react logically to the behavior of others. Furthermore, if behavior is not understood, it may be misinterpreted and the individual may react in such a way as to produce a threat to the other person's security and self-respect. This, then, might generate conflict which would add further to the difficulty of the situation.

We see here the effect on the ability to perceive others and oneself accurately and to be free to test the accuracy of one's inferences about the environment in which one lives—often labeled reality-testing. One could reason, then, that there is a correspondence between causal thinking and the ability to see oneself as others do, and to accept the reality of his peer relationships. Thus were derived the sixth and seventh hypotheses:

6. There is a significant and positive relationship between causal thinking and the correspondence between self- and peer-perceptions of self.

7. Exposure to and participation in a behavioral science class will foster significant correspondence between self- and peer-perceptions of self among fourth grade children.

At face value, causal thinking and its assumed relationship with democratic behavior, critical thinking, and adequate reality testing, may well be considered an indication of mental health. For the purpose of this study this is defined as the possession of attitudes, beliefs, aspirations, skills and achievements which contribute to a sense of well-being and which support progress toward realizing one's fullest potentialities. To the extent that a child appears to be more realistic

in his evaluation of the world around him, more aware of his own limitations as well as assets, and more willing to admit that he does not know the answer to a problem, he is likely to be psychologically healthy. This reasoning has been indirectly supported by the Muuss' research on tolerance of ambiguous stimuli and other research studies on intolerance of ambiguity quoted in the Muuss article (30). Smock, for example, showed that psychological stress tended to increase intolerance of ambiguity. Block and Block demonstrated that intolerance of ambiguity and ethnocentrism were intrinsically related. Levitt furthermore showed that a subject who is intolerant of ambiguity tends to believe popular misconceptions and superstitions. The eighth and ninth hypotheses to be tested were:

8. There is a significant and positive relationship between causal thinking and mental health assets, and a significant and negative relationship between causal thinking and mental health liabilities.

9. Exposure to and participation in a behavioral science class will foster significant growth in mental health assets and will minimize or correct significantly mental health liabilities among fourth grade children.

Causal Thinking and Social Factors

A previously cited study by Ojemann and Snider (43) indicated differential results within the four fourth-grade experimental groups and within the four fifth-grade experimental groups. Only two of the fourth-grade groups and three of the fifth-grade groups showed significant increase in causal thinking over the matched control groups. This immediately raises the question of receptivity to any planned program in the area of behavioral science, particularly in causal thinking.

Ojemann has pointed out (38) that newspapers and magazines fail to make an analytic or dynamic approach to problems of development and neglect to describe effective methods of dealing with differential causes of behavior and variability in the rate of development. Muuss also asserted in defense of his program that "we have children growing up in families, schools and communities under the influence of parents, teachers, and citizens most of whom have had relatively little preparation of a causal nature for their work in guiding children" (32, p. 123).

It seems reasonable to suppose that familial background and social environment have considerable bearing, first, on the present functioning level of causal thinking of children, and second, on the receptivity of children to such causal thinking within a behavioral science class. It seems reasonable to think further that families and communities consisting predominantly of professional and semi-professional people, who have had exposure to behavioral science concepts in college (limited as it may have been) and in their present reading materials, would be relatively more prepared to facilitate their children's receptivity to such an orientation. One might thus expect children from the higher socioeconomic levels (with intelligence held constant) to be initially more causally oriented, and to show greater increase in causal thinking than children from the lower socioeconomic level as a result of a behavioral science class. From these considerations arose the final two hypotheses:

10. Fourth-grade school children from higher socioeconomic levels will be significantly more causally oriented than children from lower socioeconomic levels.

11. Fourth-grade school children from higher socioeconomic levels will show significantly greater increase in causal thinking than children from lower socioeconomic levels as a result of exposure to and participation in a behavioral science class.

CHAPTER II

METHODOLOGY

Subjects

Four groups of fourth grade elementary school children from the Quincy, Massachusetts school system, totaling 103 in number, were utilized in the study. They included an experimental group of 23 and a control group of 21 from the Atherton Hough School and an experimental group of 30 and a control group of 29 from the Wollaston School.

The former school, Atherton Hough, serves primarily families in the lower socioeconomic level (unskilled laborers); the latter school, Wollaston School, serves primarily families in the upper middle socio-economic level and above (professional and semi-professional). To substantiate this social class difference, a social status index devised by McGuire and White (29) was utilized to obtain a mean rating of social status for each school group. A mean rating was obtained from an index score which is derived from (1) rating on a 7-point scale the "status parent" of a family on four component scales: dwelling area, house type, occupation and source of income, (2) multiplying the ratings by appropriate weights and summing the products to secure a total index score, (3) employing a table which estimates status level from total index scores for an approximation of social class.

Because of the unavailability of some of the family background information and because of the high correlation between "status parent"

occupation and the income component, for the purpose of this study each of the status parents was rated on occupation, while a representative sample of the dwellings and neighborhoods of each of the groups were rated. Extrapolating from these ratings, we obtained a total index score for each parent. These, in turn, were added and averaged to obtain a mean social status rating for each of the four classes as well as for each of the schools. A mean rating of 60 placed the Atherton Hough School in the upper-lower social class level, while a mean rating of 27 placed the Wollaston School in the upper-middle social class level closely bordering on the upper class level. This offered supportive evidence for the accepted dichotomy in socioeconomic level.

Care was further taken to match the four classes as closely as possible with respect to intelligence, grade achievement and chronological age. Table 1 lists the equivalences.

While the Wollaston groups are slightly higher with respect to I.Q. and grade achievement, the differences are not statistically significant. This is judged to be good group matching considering the heterogeniety of each of the classes and the assumed differences inherent in the various socioeconomic groups.

In addition, care was taken to match as closely as possible the four homeroom teachers with respect to age, teacher-training, teaching ability and rapport with their respective classes. The recommendations and evaluations of the two school principals were utilized to assess these equivalences. Each of the teachers was in her early twenties, and had at least one but not more than three years of teaching experience. Each had earned a B.S. degree from an accredited college within the

Boston area. Each had been given an excellent rating by her principal on both teaching ability and pupil relationship.

TABLE 1

MATCHING AGE, I.Q. AND GRADE ACHIEVEMENT OF EXPERIMENTAL AND CONTROL GROUPS

School	Mean I.Q.[1]	Grade Achievement[2]	Chronological Age
Wollaston			
Experimental	110.8	4.9	9.73
Control	110.8	4.9	9.73
Atherton Hough			
Experimental	105.0	4.4	9.76
Control	106.4	4.4	9.63

[1] I.Q.'s based on group administration of Lorge-Thorndike.

[2] Based on the Iowa Test of Basic Skills.

Procedure

For a period of one week immediately prior to the initiation of the behavioral science course, both the experimental and control groups were administered a series of tests by their individual homeroom teachers during the regular school day. These tests assessed: (1) initial level of causal thinking, (2) initial level of adjustment, (3) social relationships, and (4) individual profiles of personality factors. At the same time, each of the teachers completed a teacher-rating of each of her pupils.

In addition, midway through the behavioral science course, the parents of the children in the two experimental groups were mailed the

test assessing causal thinking with instructions to answer the test as they thought their own children would answer it.

The behavioral science course itself was conducted on the basis of one 50-minute class per week from January 5, 1965 to June 7, 1965, a period corresponding to the second half of the regular school year. The classes, totaling twenty in number, were conducted partly on a lecture basis, with the children contributing to lengthy group discussions and minor class experiments. The lecture material was further reinforced by a review and critique of pertinent research studies which served at the same time as an introduction to class-initiated experiments.

The respective fourth-grade teachers were present during the classes and took notes of the lectures and class discussions. These were incorporated into detailed resumes of each class dictated by the experimenter at the conclusion of each class (see Appendix B). A tape recorder was initially utilized in hopes of preserving verbatim class interaction but it proved ineffectual because of extraneous sound interference.

The planned class content was as follows:

Class 1:	Introduction to the concept of individual differences.
Classes 2-3:	Introduction to the complexity of causes underlying human behavior: object itself, surroundings, internal and external forces. Methods of obtaining information regarding causes: verbal inquiry, observation, experimentation.
Class 4:	Introduction to the sources of individual differences: heredity, maturation, learning.
Classes 5-7:	Discussion of the concept of heredity, function of genes, nature of hereditary characteristics.

Class 8: Administration of first objective review test.

Classes 9-10: Discussion of the concept of maturation; relationship between growth and learning.

Classes 11-13: Detailed investigation of the several stages of human development with emphasis on developing characteristics unique to each stage.

Classes 14-15: Discussion in depth of the first stage of development (infant) involving the notions of trust, love and self-learning.

Class 16: Detailed discussion of second stage of development (pre-school) involving in part the notions of increased independence, acquisition of new emotions, acceptance of consequences of one's actions.

Class 17: Administration of second objective test.

Classes 18-19: Detailed discussion of their stage of development (school age: 6-10) with emphasis on first, new learnings unique to stage: introduction to school and its associative learnings, new environments, expansion of one's vision, and second, problems arising: increased responsibility, competition, conflicts arising between child and new environments, conflicts arising between child's feelings and their expression.

Class 20: Summation. (See Appendix B for representative samples of class presentations.)

Immediately following the final class, the homeroom teachers began the readministration of the tests which extended over a one-week period. The teachers, in addition, re-rated each of their pupils.

Tests Administered

Causal Test.—This instrument was utilized to test both the first hypothesis (p. 10) which stated that exposure to and participation in a class in behavioral science will foster significant growth in causal thinking in fourth grade school children, and the remaining hypotheses asserting a positive relationship between causal thinking and democratic

behavior (hypotheses 2 and 3); critical thinking (hypotheses 4 and 5); correspondence between self- and peer-perceptions of self (hypotheses 6 and 7); levels of adjustment (hypotheses 8 and 9); socioeconomic level (hypotheses 10 and 11).

The original Causal Test was authored by Ralph Ojemann and his associates at the State University of Iowa and consists of eight descriptions of behavior, each followed by a series of true-false items, offering choices in the interpretation of the previously described behavior. The test attempts to tap the child's awareness of the complex, variable nature of human behavior (18).

Test-retest reliability of .67 was obtained on a sample of over 1,000 elementary school children. A number of studies utilizing the test have been quoted in Chapter I.

The Causal Test utilized in the present study was a revision by the present investigator, devised specifically for the fourth-grade population and modeled after the original instrument. An independent reliability study was performed utilizing 56 fourth-grade school children. Test-retest reliability (over a one-month period) of .78 was obtained (See Appendix A).

Behavior Preference Record.—This instrument was utilized to test hypotheses 2 and 3 which involved the relationship between causal thinking and democratic behavior (p. 13) and to test hypotheses 4 and 5 which deal with the relationship between causal thinking and critical thinking (p. 13).

The Record was authored by Hugh Wood, Ed.D., formerly of Columbia University and now Director, Curriculum Materials Laboratory, University of Oregon (57).

The coefficient of reliability (alternate forms) for the individual characteristics range from .774 to .876. The validity of the instrument, based on a sample of approximately 1,000 students was determined by correlating the teachers' estimates of the students on five behavioral characteristics and their critical thinking ability with their Behavior Preference Record scores on all these items. The correlation coefficients ranged from .310 to .589.

At the same time, the five characteristics have been intercorrelated with ranges of -.007 to .398 giving evidence that fairly distinct characteristics are being measured.

The test itself consists of a series of problem situations, followed by three to five possible courses of action, from which the student selects one. Following the choices is a list of possible reasons for a particular choice, from which the student selects one or more. Scores are obtained for the following aspects of democratic behavior: cooperation, friendliness, integrity, leadership and responsibility. A unique feature of the Record is the provision for measuring critical thinking in behavioral situations.

A Class Play.—This instrument was utilized to test hypotheses 6 and 7 (p. 14) which predict a relationship between causal thinking and the correspondence between self- and peer-perceptions of self. The Class Play was devised by Eli M. Bower and associates at the California State Department of Mental Health in an experimental program to screen out elementary school children with potential emotional disturbances (8). It was considered the most valid, single measure of several instruments

utilized. In one study it successfully identified 13 of 14 children who later manifested symptoms of emotional disturbance (8).

This instrument compares roles assigned to a child by his peers and roles chosen for himself. It offers two indices: (1) index of the social impact of the child in the class and (2) index of the negative impact of the child in the class. By dividing the two and obtaining a ratio, one acquires an approximation of the quantity of visibility of the child by his peers and the quality of this visibility. This instrument was utilized to assess the initial and also the increased correspondence between perception of self- and peer-perception of self as a result of exposure to the behavioral science course.

California Test of Personality.—This instrument, in conjunction with the Mental Health Analysis was utilized to test hypotheses 8 and 9 involving the relationship between causal thinking and levels of adjustment (p. 15). The California Test of Personality was authored by Louis Thorpe, Willis Clark and Ernest Tiegs, associated with the California Test Bureau (54). The test is organized around the concept of life adjustment as a balance between personal and social adjustment. Personal adjustment is assumed to be based on feelings of personal security, and social adjustment on feelings of social security. The items in the Personal Adjustment half of the test are designed to measure evidence of six components of personal security: self-reliance, sense of personal worth, sense of personal freedom, feelings of belonging, withdrawing tendencies, nervous symptoms. The items in the Social Adjustment half of the test are designed to measure six components of social security:

social standards, social skills, anti-social tendencies, family relations, school relations, occupational relations and community relations.

Split-half reliability coefficients obtained on each of the 12 sub-tests range from .75 to .97. With regard to its validity, the California Test of Personality: Manual (54), lists and briefly describes some 90 studies that utilized the instrument. Syracuse University, for example, found that the test correlated more closely with clinical findings than any other personality test. Jackson performed a study showing the relative effectiveness of paper-pencil tests, interviews and ratings as techniques for personality and found that the California Test of Personality proved superior to three rating methods (experimenter, teacher and parent) as well as clinical interview.

Mental Health Analysis.—This instrument was utilized in conjunction with the California Test of Personality to test hypotheses 8 and 9 which predict a relationship between causal thinking and level of adjustment (p. 15). The Mental Health Analysis was authored by Louis Thorpe, Willis Clark and Ernest Tiegs, associated with the California Test Bureau (55). The test is organized into two categories; Assets: close personal relationships, interpersonal skills, social participation, satisfying work and recreation, and adequate outlook and goals; and Liabilities: emotional instability, feeling of inadequacy, behavioral immaturity, concern about physical defects, and nervous manifestations. The 200 items of the test are distributed equally between the two categories and among the ten components of the Analysis.

Coefficients of reliability computed by using the Kuder-Richardson formula 21 for each of the ten sub-tests range from .80 to .85 based on a population of 425 elementary school children.

Several studies have been conducted with the Mental Health Analysis (55). Baron administered the test to 443 fifth and sixth grade children. A sociometric instrument involving four questions and allowing five choices for each question was administered. Acceptance status was determined in terms of percentile ranks within the classroom group. The upper 25 per cent in sociometric status were defined as "accepted" and the lower 25 per cent as "rejected." Using these criterion groups Baron found a significant relationship between 11 of the 13 Analysis scores and acceptance status.

A study comparing "delinquent" boys with "normal" boys was conducted by Zaiolski. He administered 14 tests, which included the Analysis, to two groups of boys. One group was composed of 50 boys enrolled in an industrial training school and the other group was composed of 50 boys enrolled in a public school. He found significant differences between the two groups on eight of the Analysis scores.

Warner conducted a study to determine the relationship of socio-moral behavior and the mental health status of high school boys. He administered the Analysis to 499 boys in a California high school. From this group, he chose a smaller group rated most adequately adjusted by at least two teachers and another smaller group rated least adequately adjusted by at least two teachers. Warner found that the Analysis successfully discriminated between the two groups.

Pupil Adjustment Inventory.—This instrument is a five-point rating scale to be completed by teachers which offers a profile covering the following pupil characteristics: Academic, Social, Emotional, Physical, Activities and Interests, School's Influence on the Pupil, and Home Background. It was utilized to obtain information to enhance our description and understanding of the causal thinker.

The Inventory itself was developed by Group B of the Suburban School Study Council, Educational Service Bureau, School of Education, the University of Pennsylvania.

Achievement Tests in Behavioral Science.—Devised by the present investigator, these instruments assessed the extent of the assimilation of the behavioral science concepts which were discussed at some length in the course. (See Appendix C for representative sample.)

Statistical Analyses

To assess the significance of the relationships among the variables which were predicted by the hypotheses and to provide the most adequate description of the causally oriented child, a stepwise multiple regression technique was used. Programed for the IBM 704-709 computers and described in Jones (20) and Cooley and Lohnes (13), this technique first generates the matrix of correlations among the variables (zero-order), the last variable being considered the criterion. The matrix is then scanned for the highest predictor-criterion correlation. The regression sum of squares of this variable on the criterion is then computed. After the selection of the best predictor, the predictor is partialed out of the entire correlation matrix. The partials with the

criterion are then scanned for the highest value. This variable is then selected as the next predictor to be added to the prediction equation. The new regression sum of squares is computed along with the F-value. The increase in sums of squares over the previous regression is also computed along with its significance. The regression equation is thus built up in a stepwise fashion until the F-value for the increase in sums of squares falls below a specified critical value.

To assess the change in the experimental groups with regard to the measured variables as a result of exposure to the behavioral science course, and to determine the extent of the mean differences between the experimental and control groups, a modified analysis of covariance was used. This analysis called ANOVA and programed for the IBM 704-709, described in Jones (20) and Cooley and Lohnes (13), avoids the compounding of errors that takes place in the traditional analysis of covariance that assesses the significance of difference between sets of differences between pre- and post-test scores. By subtracting such scores, one initially adds the error associated with each and deals with this compounded error when comparing the difference score with other difference scores which in turn include their own compounded errors. The ANOVA technique reduces the error term by dealing primarily with only the error of one score, the post-test score. The pre-test scores are simply regressed upon the post-test scores producing predicted post-test scores. Since each individual's predicted score is based upon all the pre-test scores of the group contributing to the regression line, each error involved in each pre-test score is cancelled out by the other scores. The F is calculated on the difference between the actual post-test scores and the predicted post-test scores of each of the respective

groups, while the means of the post-test scores are adjusted for the difference between the groups' initial pre-test means. This enables one to determine the direction of any significant change between the pre- and post-test means of the respective groups.

To assess the contributing effect of each of the more significant measured variables to change in the criterion variable, causal thinking, the stepwise multiple regression technique was used a second time. This time the variable to be predicted was change in causal thinking with post-test scores in causal thinking serving as the criterion. Information obtained in this manner would assist one both in predicting change in causal thinking and in assessing the major factors that would contribute to one's deriving maximum benefit from the behavioral science course ordered toward change in causal thinking.

In addition, individual t-tests were computed to provide complementary information and further clarification in the assessment of significant differences between group means with respect to several of the measured variables (17).

CHAPTER III

TEST RESULTS

Analyses of Measures Secured Before the Behavioral Science Class

Data from the testing conducted prior to the initiation of the experimental behavioral science class were analyzed first, to test the following hypotheses:

2. There is a significant and positive relationship between causal thinking and democratic behavior which is a composite of several secondary characteristics, each of which is in turn, significantly related to causal thinking (p. 13).

4. There is a significant and positive relationship between causal thinking and critical thinking (p. 13).

6. There is a significant and positive relationship between causal thinking and the correspondence between self- and peer-perception of self (p. 14).

8. There is a significant and positive relationship between causal thinking and mental health assets, and a significant and negative relationship between causal thinking and mental health liabilities (p. 15).

10. Children from higher socioeconomic level will be significantly more causally oriented than children from lower socioeconomic level (p. 16),

and secondly, to provide the most adequate description of the causally-thinking child in terms of the variables included in this study.

Table 2 provides the initial zero-order matrix of correlations among the significant variables including total test scores generated by the stepwise multiple regression technique. Here all the subjects were assessed as a total unit with the socioeconomic variable treated

TABLE 2

INTERCORRELATIONS OF VARIABLES PLUS TOTAL TEST SCORES OF UNDICHOTOMIZED SUBJECTS

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Means	1.53	71.13	62.55	50.53	53.49	21.64	70.18	2.94	2.78	3.18	3.53	3.34	3.58	3.21
S.D.	0.50	13.91	18.59	10.32	10.00	7.65	13.38	0.28	0.61	0.86	1.01	0.95	0.78	0.92
1	1.00													
2	0.15	1.00												
3	0.11	0.29	1.00											
4	0.17	0.42	0.70	1.00										
5	0.24	0.55	0.61	0.75	1.00									
6	0.22	0.37	0.30	0.35	0.44	1.00								
7	0.10	0.46	0.42	0.54	0.51	0.49	1.00							
8	0.09	0.14	0.18	0.13	0.15	0.14	0.24	1.00						
9	0.24	0.15	0.11	0.18	0.26	0.16	0.29	0.22	1.00					
10	0.19	0.27	0.17	0.32	0.39	0.29	0.21	0.04	0.52	1.00				
11	0.09	0.13	0.00	0.20	0.16	0.19	0.06	0.01	0.18	0.50	1.00			
12	0.19	0.31	0.15	0.27	0.30	0.27	0.19	0.16	0.30	0.63	0.66	1.00		
13	0.09	0.16	0.18	0.26	0.35	0.32	0.16	0.26	0.35	0.58	0.44	0.63	1.00	
14	0.12	0.33	0.25	0.38	0.47	0.36	0.22	0.17	0.43	0.72	0.55	0.71	0.69	1.00
15	0.09	0.33	0.09	0.24	0.33	0.29	0.22	0.17	0.35	0.65	0.64	0.77	0.66	0.75
16	-0.08	0.17	0.16	0.16	0.20	0.08	0.05	0.08	0.08	0.35	0.35	0.37	0.35	0.49
17	0.14	0.40	0.18	0.30	0.34	0.31	0.25	0.05	0.32	0.65	0.48	0.52	0.41	0.48
18	0.27	0.28	0.19	0.40	0.41	0.30	0.28	0.07	0.54	0.86	0.56	0.61	0.61	0.67
19	0.18	0.12	0.08	0.19	0.31	0.21	0.18	0.06	0.36	0.60	0.40	0.47	0.59	0.58
20	0.20	0.26	0.26	0.35	0.37	0.30	0.23	0.09	0.40	0.71	0.53	0.57	0.54	0.67
21	-0.10	-0.03	0.19	0.23	0.18	0.02	0.16	0.03	0.04	0.08	0.29	0.20	0.01	0.09
22	0.03	0.12	0.09	0.29	0.24	0.09	0.09	0.10	0.22	0.41	0.58	0.51	0.33	0.49
23	-0.32	-0.36	-0.17	-0.32	-0.38	-0.27	-0.29	0.01	-0.40	-0.48	-0.28	-0.48	-0.27	-0.45
24	-0.16	-0.24	-0.18	-0.20	-0.21	-0.07	-0.31	-0.18	-0.24	-0.11	-0.06	-0.17	-0.12	-0.12
25	-0.19	-0.17	-0.04	-0.16	-0.20	-0.19	-0.07	0.11	-0.20	-0.35	-0.21	-0.31	-0.16	-0.32
26	0.11	0.32	0.26	0.24	0.34	0.23	0.17	0.14	-0.03	0.31	0.33	0.29	0.25	0.31
27	0.05	-0.11	-0.13	-0.13	-0.15	-0.06	-0.20	-0.03	-0.02	-0.00	-0.06	0.10	0.03	-0.03
28	0.09	0.27*	0.37*	0.37*	0.43*	0.29*	0.33*	0.17	0.03	0.24*	0.06	0.18	0.20*	0.09

TABLE 2—Continued

Variables	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Means	3.25	3.22	3.37	3.28	3.69	3.03	3.08	3.46	46.12	26.80	19.22	108.58	3.74	15.82
S.D.	0.97	0.52	0.88	0.83	0.68	0.88	0.67	1.05	29.58	20.49	34.25	11.30	1.77	5.06
1														
2														
3														
4														
5														
6														
7														
8														
9														
10														
11														
12														
13														
14														
15	1.00													
16	0.46	1.00												
17	0.59	0.23	1.00											
18	0.63	0.26	0.66	1.00										
19	0.55	0.54	0.38	0.57	1.00									
20	0.58	0.32	0.59	0.71	0.52	1.00								
21	0.10	-0.02	0.16	0.18	-0.03	0.10	1.00							
22	0.44	0.23	0.37	0.48	0.32	0.50	0.45	1.00						
23	-0.28	-0.02	-0.37	-0.55	-0.32	-0.43	-0.21	-0.31	1.00					
24	-0.16	0.03	-0.11	-0.14	-0.10	-0.09	-0.08	-0.00	0.09	1.00				
25	-0.15	-0.03	-0.25	-0.39	-0.22	-0.32	-0.13	-0.26	0.30	-0.52	1.00			
26	0.41	0.23	0.44	0.33	0.28	0.29	0.21	0.25	-0.28	-0.13	-0.16	1.00		
27	-0.08	-0.06	-0.14	-0.07	-0.06	-0.13	-0.37	-0.17	0.16	0.12	0.06	-0.26	1.00	
28	0.17	0.04	0.26*	0.28*	0.12	0.19	0.18	0.09	-0.16	-0.13	-0.06	0.39*	-0.18	1.00

*Significant <.05.

$r_{0.01} = 0.256$; $r_{0.05} = 0.195$; N = 97.

TABLE 2—Continued

Index of Variables	
1. Sex	15. Personal Worth
2. Assets: Mental Health Analysis	16. State of Health
3. Liability: Mental Health Analysis	17. Activities and Interests
4. Personal Adjustment: C. P. P.	18. Attitude toward School
5. Social Adjustment: C. P. P.	19. School Attendance
6. Democratic Behavior: B.P.R.	20. School's Influence
7. Critical Thinking: B.P.R.	21. Economic Status
8. Chronological Age	22. Family Life
9. Achievement	23. Negative Peer Perception
10. Attitude toward Schoolwork	24. Negative Self Perception
11. Sociability	25. Discrepancy: Peer-Self
12. Social Acceptance	26. I.Q.
13. Types of Associates	27. Socio-Economic Class
14. Temperament	28. Causal Thinking

Variables 8 - 22 are Teacher Ratings

Variable 28 (Causal Thinking) is criterion.

not as a dichotomizing category but as a continuous variable ranked on a six-point scale extending from upper class, 1, to lower-lower class, 6.

Table 3 lists the variables significantly related to the criterion variable: causal thinking, 28.

TABLE 3

VARIABLES SIGNIFICANTLY RELATED TO CRITERION: CAUSAL THINKING

	Variables	r	Probability
2.	Assets (M.H.A.)	0.27	<.01
3.	Freedom from Liabilities (M.H.A.)	0.37	<.01
4.	Personal Adjustment (C.P.P.)	0.37	<.01
5.	Social Adjustment (C.P.P.)	0.43	<.01
6.	Democratic Behavior (B.P.R.)	0.29	<.01
7.	Critical Thinking (B.P.R.)	0.33	<.01
10.	Attitude toward Schoolwork (Teacher Rating)	0.24	<.01
13.	Types of Associates (Teacher Rating)	0.20	<.01
17.	Activities and Interests (Teacher Rating)	0.26	<.01
18.	Attitude toward School (Teacher Rating)	0.28	<.01
26.	I.Q.	0.39	<.01

The significance of the relationships at the zero-order correlation provides suggestive evidence that permit one to reject the following null hypotheses:

2. There is no significant and positive relationship between causal thinking and democratic behavior.

4. There is no significant and positive relationship between causal thinking and critical thinking.

8. There is no significant and positive relationship between causal thinking and mental health assets, and no significant and negative relationship between causal thinking and mental health liabilities.

The relationship between causal thinking and the correspondence between self- and peer-perception of self (variable 25), although in the right direction (-0.06: the less the discrepancy between self- and peer-perception of self the greater the causal thinking ability), did not reach significance. Therefore, we cannot reject null hypothesis 6.

6. There is no significant and positive relationship between causal thinking and the correspondence between self- and peer-perception of self.

The relationship between causal thinking and socioeconomic level (variable 27), again, although in the right direction (-0.18: the higher the socioeconomic level, the higher the causal thinking ability), did not reach significance. However, it was suggested on the strength of the group mean of 3.74 on the 6-point rating (Table 2), that there may have been considerable overlap in the middle range to mitigate against a significant linear relationship between causal thinking and socioeconomic level. Therefore, the children in the upper socioeconomic level only (ratings 1 and 2) and the children in the lower socioeconomic level only (ratings 5 and 6) were selected out resulting in N's of 33 and 43, respectively. A t-test was conducted to assess the difference between the two selected groups with respect to their causal thinking test mean scores. Table 4 presents the findings.

Table 4 indicates a significant difference beyond the .02 level of significance between the socioeconomic groups and their respective causal thinking test mean scores. With this supportive evidence, therefore, we may reject null hypothesis 10:

TABLE 4

MEAN TEST SCORES OF TWO SOCIOECONOMIC GROUPS ON CAUSAL THINKING

		Upper Socioeconomic Group	Lower Socioeconomic Group
N		33	43
Mean Scores		17.21	14.98
t-value	2.5		
Probability	$<.02$		

10. Fourth grade elementary school children from higher socioeconomic levels will not be significantly more causally oriented than children from lower socioeconomic levels.

From the set of correlations listed in Table 2, a "best" regression equation for predicting the causal thinking score was derived. The Social Adjustment variable (5) was the most highly correlated (0.43). The following regression equation presents the variables in the order of their inclusion:

Causal Thinking = +.2 (Social Adjustment) + .12 (I.Q.) -2.0 (Temperament: Teacher Rating) + 1.6 (Attitude toward School: Teacher Rating) -7.27.

The following table presents the beta weights and t-values for each predictor.

Table 5 indicates the substantial predictive value of both Social Adjustment and I.Q. with regard to the criterion variable: causal thinking. While the Social Adjustment variable proved to be of significance as was predicted, there remained the question of the line of causality between social adjustment and causal thinking. The assumption

TABLE 5

THE STANDARDIZED REGRESSION EQUATION OF MAJOR VARIABLES PREDICTIVE OF CRITERION: CAUSAL THINKING

	Variables	Beta	t-value	Probability*
5.	Social Adjustment (C.P.P.)	0.398	3.94	<.01
26.	I.Q.	0.278	2.95	<.01
14.	Temperament (Teacher Rating)	-0.363	-3.01	<.01
18.	Attitude Toward School (Teacher Rating)	0.261	2.22	<.05

*Population value of beta is zero (two-tailed; N = 97).

was that the latter facilitates the former although the relationship might well be reciprocal. Partial correlation was utilized to provide some suggestive evidence for the direction of the line of causality. Table 6 lists the variables and their relationships with each of the variables being alternately partialed out.

Table 6 indicates that a significant relationship between causal thinking and social adjustment remains when I.Q. is partialed out. Furthermore, the removal of causal thinking lessens to a greater extent the relationship between the remaining two variables than does the removal of either social adjustment or I.Q.

To further refine our understanding of the causal thinker, an additional stepwise multiple regression technique was utilized to choose predictors for the criterion variable among the sub-scales of the battery of tests whose total scores had been used in the previous intercorrelation (Table 2).

TABLE 6

INTERCORRELATIONS OF CRITERION: CAUSAL THINKING WITH TWO MAJOR PREDICTORS

Variables 1	2	3
I.Q.	Social Adjustment	Causal Thinking
		Change
$r_{12} = 0.34$ <.01	$r_{12.3} = 0.22$ <.05	-.12
$r_{23} = 0.43$ <.01	$r_{23.1} = 0.35$ <.01	-.08
$r_{13} = 0.39$ <.01	$r_{13.2} = 0.29$ <.01	-.10

Table 7 provides the initial zero-order matrix of correlations among the sub-scales. It indicates a significant relationship between the criterion variable: causal thinking (28) and the majority of the sub-scale variables. The exceptions were: Interpersonal Skills (2), Community Relations (22) and Leadership (26). This latter, however, is the only exception among the five variables making up the total description of Democratic Behavior and therefore prevents our rejecting the second part of null hypothesis 2, to wit: "each of the secondary characteristics subsumed under democratic behavior is in turn not significantly related to causal thinking."

An additional regression equation was built up in a stepwise fashion as before. Freedom from Behavioral Immaturity (variable 6) was the most highly correlated (0.44). When this variable was partialed out, variable 5: Adequate Outlook and Goals had the highest partial correlation with the criterion. As before, this process was continued until the increase in variance fell below an arbitrarily set probability

TABLE 7

INTERCORRELATIONS OF CRITERION AND SUB-SCALE SCORES OF UNDICHOTOMIZED SUBJECTS

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13
Means	15.03	14.14	14.06	14.29	13.87	11.30	11.53	11.76	15.61	12.91	7.19	8.53	9.33
S.D.	3.35	3.39	3.42	3.26	3.18	4.13	4.56	4.37	4.52	4.61	1.69	2.19	2.25
1	1.00												
2	0.66	1.00											
3	0.68	0.67	1.00										
4	0.64	0.63	0.68	1.00									
5	0.53	0.56	0.57	0.69	1.00								
6	0.22	0.18	0.23	0.22	0.26	1.00							
7	0.22	0.25	0.09	0.19	0.10	0.71	1.00						
8	0.23	0.24	0.21	0.23	0.11	0.69	0.82	1.00					
9	0.35	0.34	0.32	0.39	0.42	0.55	0.47	0.52	1.00				
10	0.20	0.12	0.05	0.22	0.19	0.51	0.62	0.68	0.71	1.00			
11	0.37	0.34	0.27	0.31	0.32	0.35	0.29	0.35	0.36	0.25	1.00		
12	0.38	0.34	0.26	0.33	0.17	0.25	0.39	0.40	0.33	0.29	0.52	1.00	
13	0.47	0.15	0.16	0.21	0.26	0.37	0.37	0.38	0.39	0.39	0.30	0.31	1.00
14	0.47	0.40	0.46	0.51	0.38	0.35	0.43	0.47	0.37	0.40	0.24	0.56	0.40
15	0.22	0.14	0.17	0.23	0.13	0.60	0.65	0.66	0.45	0.50	0.29	0.40	0.50
16	0.22	0.14	0.05	0.22	0.21	0.40	0.50	0.56	0.53	0.73	0.26	0.42	0.57
17	0.44	0.30	0.42	0.46	0.34	0.46	0.30	0.41	0.33	0.23	0.25	0.24	0.37
18	0.57	0.37	0.44	0.44	0.42	0.33	0.24	0.30	0.25	0.22	0.40	0.50	0.35
19	0.28	0.21	0.18	0.26	0.20	0.48	0.50	0.52	0.52	0.47	0.36	0.50	0.44
20	0.37	0.38	0.31	0.54	0.50	0.39	0.39	0.40	0.56	0.42	0.38	0.28	0.50
21	0.39	0.34	0.35	0.49	0.48	0.56	0.52	0.54	0.49	0.47	0.40	0.36	0.41
22	0.36	0.35	0.26	0.37	0.32	0.18	0.25	0.31	0.41	0.33	0.42	0.35	0.27
23	0.21	0.23	0.25	0.31	0.24	0.23	0.19	0.18	0.39	0.23	0.23	0.26	0.20
24	0.23	0.29	0.25	0.20	0.25	0.34	0.20	0.19	0.29	0.11	0.20	0.14	0.25
25	0.15	0.22	0.10	0.12	0.24	0.17	0.12	0.09	0.20	0.10	0.18	0.15	0.21
26	0.27	0.16	0.31	0.34	0.34	0.19	0.06	0.14	0.35	0.09	0.07	0.12	0.15
27	0.27	0.29	0.29	0.33	0.23	0.36	0.15	0.19	0.33	0.14	0.27	0.27	0.24
28	0.28*	0.13	0.30*	0.24*	0.36*	0.44*	0.27*	0.38*	0.30*	0.26*	0.37*	0.25*	0.38*

TABLE 7—Continued

Variables	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Means	9.53	8.18	7.89	9.61	8.32	8.18	9.57	8.77	9.42	6.77	3.01	0.16	4.93	8.75	15.82
S.D.	2.16	3.00	2.88	1.80	2.04	2.49	2.37	2.42	2.21	1.82	2.11	1.34	1.76	2.90	5.06
1															
2															
3															
4															
5															
6															
7															
8															
9															
10															
11															
12															
13															
14	1.00														
15	0.55	1.00													
16	0.50	0.59	1.00												
17	0.25	0.36	0.25	1.00											
18	0.49	0.37	0.30	0.35	1.00										
19	0.47	0.73	0.53	0.38	0.48	1.00									
20	0.32	0.48	0.50	0.43	0.39	0.55	1.00								
21	0.48	0.59	0.56	0.53	0.50	0.68	0.61	1.00							
22	0.29	0.31	0.36	0.40	0.34	0.44	0.48	0.50	1.00						
23	0.28	0.18	0.16	0.22	0.19	0.30	0.33	0.32	0.26	1.00					
24	0.27	0.20	0.26	0.25	0.21	0.25	0.27	0.32	0.23	0.62	1.00				
25	0.12	0.14	0.10	0.11	0.25	0.18	0.14	0.23	0.15	0.35	0.24	1.00			
26	0.14	0.14	0.16	0.28	0.12	0.20	0.31	0.24	0.18	0.42	0.36	0.18	1.00		
27	0.25	0.30	0.25	0.39	0.35	0.38	0.34	0.45	0.25	0.59	0.65	0.53	0.49	1.00	
28	0.26*	0.23*	0.25*	0.38*	0.36*	0.33*	0.36*	0.41*	0.16	0.26*	0.26*	0.23*	0.16	0.20*	1.00

*Significant <.05

$r_{0.01} = 0.256$; $r_{0.05} = 0.195$; N = 97.

TABLE 7—Continued

Index of Variables

1.	Close Personal Relationships	15.	Withdrawing Tendencies (Freedom From)
2.	Inter-personal Skills	16.	Nervous Symptoms (Freedom From)
3.	Social Participation	17.	Social Standards
4.	Satisfying Work and Recreation	18.	Social Skills
5.	Adequate Outlook and Goals	19.	Anti-Social Tendencies
6.	Behavioral Immaturity (Freedom From)	20.	Family Relations
7.	Emotional Instability (Freedom From)	21.	School Relations
8.	Feelings of Inadequacy (Freedom From)	22.	Community Relations
9.	Physical Defects (Freedom From)	23.	Cooperation
10.	Nervous Manifestations	24.	Friendliness
11.	Self-Reliance	25.	Integrity
12.	Sense of Personal Worth	26.	Leadership
13.	Sense of Personal Freedom	27.	Responsibility
14.	Feeling of Belonging	28.	Causal Thinking

Variables: 1-5 Sub-Scales: Mental Health Assets
Variables: 6-10 Sub-Scales: Mental Health Liabilities

Variables: 11-16 Sub-Scales: Personal Adjustment: California Test of Personality
Variables: 17-22 Sub-Scales: Social Adjustment: California Test of Personality

Variables: 23-27 Sub-Scales: Democratic Behavior Behavior Preference Record

Variable: 28 (Causal Thinking) = Criterion

was .1. The following regression equation presents the variables in order of their inclusion.

Causal Thinking = +.33 (Freedom from Behavioral Immaturity) +.32 (Adequate Outlook and Goals) +.40 (Sense of Personal Freedom) +.47 (Self-Reliance) +.56.

Table 8 presents the beta weights and t-values for each predictor.

TABLE 8

THE STANDARDIZED REGRESSION EQUATION OF SUB-TEST SCORES PREDICTIVE OF CRITERION

Variables	Beta	t-value	Probability*
6. Freedom from Behavioral Immaturity	0.267	2.76	<.01
5. Adequate Outlook and Goals	0.198	2.13	<.05
13. Sense of Personal Freedom	0.179	1.88	<.10
11. Self-Reliance	0.159	1.65	.11

*Population value of beta is zero (two-tailed; N = 97).

The multiple correlation associated with the above regression equation is 0.56. This is almost identical with the multiple correlation associated with the first regression equation (Table 5). This means we are explaining about 32 per cent of the criterion variable with each of the equations. While this is somewhat low, it must be taken into consideration that not all variables that might affect causal thinking have been taken into consideration. Furthermore, perfect prediction is not possible even when a precisely analogous

test is given within a short time interval (test-retest reliabilities rarely run above 0.90 or 81 per cent of test variance).

An additional investigation was made with respect to the parent-child relationship existing for the members of our two experimental groups (N = 52). The parents of these children were requested to complete the causal thinking test as they thought their own children would complete them. These scores were then compared with the scores of their own children and a discrepancy score was derived for each parent-child relationship. A product-moment correlation was then run between these discrepancy scores and the four individual scores measuring personal and social adjustment of each of the children. Table 9 lists the variables and the corresponding correlations with the discrepancy between parent and child on the causal thinking test.

TABLE 9

RELATIONSHIPS BETWEEN PARENT-CHILD CAUSAL THINKING SCORES AND ADJUSTMENT

Variables	r-value	Probability
Discrepancy and Social Adjustment (C.P.P.)	-0.39	<.01
Discrepancy and Personal Adjustment (C.P.P.)	-0.35	.01
Discrepancy and Mental Health Assets	-0.18	-
Discrepancy and Mental Health Liabilities	-0.31	<.05

Results clearly indicate a significant and negative relationship between the discrepancy of parent-child and the adjustment of the child. This offers a confirmatory note to what has been accepted in clinical circles for years.

Analyses of Measures Secured After Behavioral Science Class

Data from the post-testing conducted following the termination of the experimental behavioral science class were analyzed first, to test the following hypotheses:

1. Exposure to and participation in a class in behavioral science (which includes the disciplines of psychology, sociology and anthropology) will foster significant growth in causal thinking in fourth-grade elementary school children (p. 9).

3. Exposure to and participation in a behavioral science class will foster significant growth in democratic behavior among fourth-grade children (p. 13).

5. Exposure to and participation in a behavioral science class will foster significant growth in critical thinking among fourth-grade children (p. 13).

7. Exposure to and participation in a behavioral science class will foster significant correspondence between self- and peer-perceptions of self among fourth-grade children (p. 14).

9. Exposure to and participation in a behavioral science class will foster significant growth in mental health assets and will minimize or correct significantly mental health liabilities among fourth-grade children (p. 15).

11. Children from high socioeconomic levels, being more receptive to causal orientation, will show significantly greater increase in causal thinking than children from lower socioeconomic levels as a result of exposure to and participation in a behavioral science class (p. 16),

and secondly, to assess the contributing force of each of the more significant measured variables to positive change in the criterion variable: causal thinking.

To accomplish these two aims, a 2 x 2 design analysis of covariance (ANOVA technique, p. 29) was utilized. Subjects were grouped into experimental and control, high socioeconomic level and low socioeconomic level.

The criterion variable, causal thinking, was assessed first.

TABLE 10

ANALYSIS OF COVARIANCE FOR CAUSAL THINKING SCORES

Effects	df	Adjusted Sums of Squares	Mean Squares	F	Prob-ability
Experimental-Control	1	37.3376	37.3376	2.07	<.2
Socioeconomic Levels	1	6.1555	6.1555		
Interaction	1	1.2799	1.2799		
Within	89	1599.5215	17.9722		
Total	92	1644.2944			

Significant F ratio for the first effect indicates a significant difference between the experimental and control groups with respect to change in the causal thinking variable. Review of the mean test scores indicates greater change was in the direction of the experimental group (Table 11).

At the stated level of significance, we may, therefore, reject null hypothesis 1:

1. Exposure to and participation in a class in behavioral science will not foster significant growth in causal thinking in fourth-grade elementary school children.

Table 11 also indicates that the second effect (Socioeconomic Levels) was in the predicted direction but a level of significance was not reached. Therefore, we may not reject hypothesis 11:

TABLE 11

MEAN TEST SCORES FOR CAUSAL THINKING

Groups	Mean Scores		
	Pre	Post	Adjusted
Experimental	15.85	19.34	18.72
Control	15.89	18.11	15.87
High Socioeconomic	16.26	19.19	19.35
Low Socioeconomic	15.35	18.10	18.09

11. Elementary school children from higher socioeconomic levels, will not show significantly greater increase in causal thinking than children from lower socioeconomic levels as a result of exposure to and participation in a behavioral science class.

Assessment of change in the variable; Democratic Behavior brought about a significant F ratio for the first effect indicating a significant difference between the experimental and control groups with respect to change in the democratic behavior (Table 12).

Review of the mean test scores indicates greater change was in the direction of the experimental group (Table 13).

At the stated level of significance, we may, therefore, reject null hypothesis 3:

3. Exposure to and participation in a behavioral science class will not foster significant growth in democratic behavior among fourth-grade children.

Assessment of change in the variable, Critical Thinking, brought about somewhat different results.

TABLE 12

ANALYSIS OF COVARIANCE FOR DEMOCRATIC BEHAVIOR SCORES

Effects	df	Adjusted Sums of Squares	Mean Squares	F	Probability
Experimental Control	1	87.2341	87.2341	2.95	<.1
Socioeconomic Levels	1	3.2369	3.2369		
Interaction	1	24.5352	24.5352		
Within	89	2632.2552	29.5459		
Total	92	2747.2614			

TABLE 13

MEAN TEST SCORES FOR DEMOCRATIC BEHAVIOR

Groups	Mean Scores		
	Pre	Post	Adjusted
Experimental	21.34	23.32	23.49
Control	21.96	21.72	21.56
High Socioeconomic	23.09	23.46	22.68
Low Socioeconomic	19.70	21.25	22.30

TABLE 14

ANALYSIS OF COVARIANCE FOR CRITICAL THINKING SCORES

Effects	df	Adjusted Sums of Squares	Mean Squares	F	Probability
Experimental Control	1	74.1107	74.1107	-	
Socioeconomic Levels	1	0.5857	0.5857	-	
Interaction	1	343.2307	343.2307	5.47	<.05
Within	89	5583.6515	62.7264	-	
Total	92	6000.5785			

Significant F ratio for the third effect indicates a significant difference involving the interaction between the four groups with respect to change in the critical thinking variable. Review of the mean test scores indicates greater change was in the direction of the low socioeconomic experimental group and the high socioeconomic control group.

TABLE 15

MEAN TEST SCORES FOR CRITICAL THINKING

Groups	Mean Scores		
	Pre	Post	Adjusted
Experimental	71.13	71.53	71.19
Control	68.98	72.64	72.98
High Socioeconomic	72.83	72.89	72.02
Low Socioeconomic	66.30	71.00	72.18

TABLE 16

ADJUSTED INTERACTION EFFECT MEANS

	Experimental	Control
High Socioeconomic	69.48	74.55
Low Socioeconomic	73.51	70.85

Results, though significant, do not allow us to reject null hypothesis 5 as originally stated:

5. Exposure to and participation in a behavioral science class will not foster significant growth in critical thinking among fourth-grade children.

Assessment of change in the variables, Mental Health Assets and Mental Health Liabilities (freedom from), revealed yet another different result.

TABLE 17

ANALYSIS OF COVARIANCE FOR MENTAL HEALTH ASSETS SCORES

Effects	df	Adjusted Sums of Squares	Mean Squares	F	Probability
Experimental Control	1	514.6324	514.6324	4.81	$<.05$
Socioeconomic Levels	1	229.4326	229.4326		
Interaction	1	29.7836	29.7836		
Within	89	10083.8101	113.3012		
Total	92	10857.6587			

Significant F ratio for the first effect indicates a significant difference between the experimental and control groups with respect to change in the Mental Health Assets variable. Review of the mean test scores indicates greater change was in the direction of the control group (Table 18).

With regard to the Mental Health Liabilities, significant F ratios for the first and third effect indicate both a significant difference between the experimental and control groups and a significant difference involving the interaction between the four groups with respect to change (Table 19).

TABLE 18

MEAN TEST SCORES FOR MENTAL HEALTH ASSETS

Groups	Mean Scores		
	Pre	Post	Adjusted
Experimental	72.40	73.23	72.42
Control	69.96	76.30	77.12
High Socioeconomic	74.57	78.50	76.17
Low Socioeconomic	66.47	69.72	72.87

TABLE 19

ANALYSIS OF COVARIANCE FOR MENTAL HEALTH LIABILITIES SCORES

Effects	df	Adjusted Sums of Squares	Mean Squares	F	Probability
Experimental Control	1	1598.5294	1598.5294	11.09	<.001
Socioeconomic Levels	1	59.4285	59.4285	-	
Interaction	1	441.0841	441.0841	3.27	<.1
Within	89	12013.6451	134.9848		
Total	92	14112.6871			

TABLE 20

MEAN TEST SCORES FOR MENTAL HEALTH LIABILITIES

Groups	Mean Scores		
	Pre	Post	Adjusted
Experimental	63.30	66.11	65.90
Control	62.68	73.94	74.15
High Socioeconomic	65.19	72.20	70.71
Low Socioeconomic	60.02	67.07	69.09

TABLE 21

ADJUSTED INTERACTION EFFECT MEANS

	Experimental	Control
High Socioeconomic	68.47	72.96
Low Socioeconomic	62.43	75.75

Review of the mean test scores indicates greater change was primarily in the direction of the control group, with further indication of significant change in the direction of the high socioeconomic experimental group.

In light of these findings, we may not reject the null hypothesis 9 as originally stated:

> 9. Exposure to and participation in a behavioral science class will not foster significant growth in mental health assets and will not minimize or correct significantly mental health liabilities among fourth-grade children.

Assessment of change in the variable, discrepancy between self- and peer-perception of self revealed no significant change.

Although the mean scores indicate that change is decidedly in the predicted direction (Table 23), lack of significance prevents rejection of null hypothesis 7:

> 7. Exposure to and participation in a behavioral science class will not foster significant correspondence between self- and peer-perception of self among fourth-grade children.

TABLE 22

ANALYSIS OF COVARIANCE FOR SELF-PEER PERCEPTIONS DISCREPANCY SCORES

Effects	df	Adjusted Sums of Squares	Mean Squares	F	Probability
Experimental Control	1	504.8267	504.8267		
Socioeconomic Levels	1	311.4614	311.4614		
Interaction	1	24.7593	24.7593		
Within	89	57560.6704	646.7491		
Total	92	58401.7178			

TABLE 23

MEAN TEST SCORES FOR SELF-PEER PERCEPTION DISCREPANCY

	Mean Scores		
Groups	Pre	Post	Adjusted
Experimental	16.91	21.60	21.97
Control	18.79	17.70	17.33
High Socioeconomic	18.24	21.37	21.22
Low Socioeconomic	17.32	17.32	17.53

To assess the contributing force, if any, of each of the more significantly related measured variables to positive change in the criterion variable, causal thinking, a stepwise multiple regression technique was employed once again. Table 24 provides the initial zero-order matrix of correlations among the significant variables.

TABLE 24

INTERCORRELATIONS OF VARIABLES PREDICTIVE OF CHANGE IN CAUSAL THINKING

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13
Means	1.55	15.87	71.18	62.99	50.61	53.74	21.65	70.05	45.09	27.13	17.85	108.05	18.72
S.D.	0.50	4.95	14.10	18.23	10.39	10.01	7.73	13.56	29.19	20.71	33.76	11.30	5.20
1	1.00												
2	0.07	1.00											
3	0.18	0.30	1.00										
4	0.14	0.38	0.31	1.00									
5	0.18	0.38	0.43	0.70	1.00								
6	0.26	0.47	0.55	0.61	0.75	1.00							
7	0.21	0.28	0.37	0.33	0.36	0.45	1.00						
8	0.15	0.36	0.46	0.44	0.54	0.52	0.50	1.00					
9	-0.30	-0.18	-0.36	-0.18	-0.34	-0.37	-0.28	-0.31	1.00				
10	-0.18	-0.14	-0.24	-0.20	-0.21	-0.23	-0.07	-0.31	0.11	1.00			
11	-0.16	-0.06	-0.16	-0.03	-0.16	-0.18	-0.19	-0.08	0.79	-0.52	1.00		
12	0.07	0.38	0.32	0.27	0.24	0.35	0.22	0.19	-0.26	-0.15	-0.13	1.00	
13	0.10	0.59*	0.31*	0.22*	0.22*	0.38*	0.21*	0.19	-0.12	0.20*	0.02	0.39*	1.00

*Significant <.05.

$r_{0.01} = 0.263$; $r_{0.05} = 0.202$; N = 94.

TABLE 24—Continued

Index of Significant Variables	
1.	Sex
2.	Pre-test Scores: Causal Thinking
3.	Pre-test Scores: Mental Health Assets
4.	Pre-test Scores: Mental Health Liabilities (Freedom From)
5.	Pre-test Scores: Personal Adjustment
6.	Pre-test Scores: Social Adjustment
7.	Pre-test Scores: Democratic Behavior
8.	Pre-test Scores: Critical Thinking
9.	Pre-test Scores: Negative Peer Perception
10.	Pre-test Scores: Negative Self Perception
11.	Pre-test Scores: Discrepancy: Peer - Self Perceptions
12.	I.Q.
13.	Post-test Scores: Causal Thinking

Variable 13 (Post-test Scores: Causal Thinking) is criterion.

Table 25 lists the variables significantly related to the criterion variable identified in the matrix as the post-test scores in causal thinking (variable 13).

From the set of correlations listed in Table 25, a "best" regression equation for predicting positive change in causal thinking was derived. The initial level of causal thinking (variable 2) was the most highly correlated (0.59) to which was added only the I.Q. (variable 12).

TABLE 25

VARIABLES SIGNIFICANTLY RELATED TO POSITIVE CHANGE IN CRITERION

	Variables	r	Probability
2.	Pre-test Scores: Causal Thinking	0.59	$<.01$
3.	Pre-test Scores: Assets (M.H.A.)	0.31	$<.01$
4.	Pre-test Scores: Liabilities (M.H.A.)	0.22	$<.05$
5.	Pre-test Scores: Personal Adjustment (C.P.P.)	0.22	$<.05$
6.	Pre-test Scores: Social Adjustment (C.P.P.)	0.38	$<.01$
7.	Pre-test Scores: Democratic Behavior	0.21	$<.05$
10.	Pre-test Scores: Negative Self Perception	0.20	$<.05$
12.	I.Q.	0.39	$<.01$

Regression Equation:

Positive Change in Causal Thinking = +.5 (Initial level of causal thinking) +.09 (I.Q.) +.56.

Table 26 presents the beta weights and t values for each of the predictors included in the equation.

TABLE 26

THE STANDARDIZED REGRESSION EQUATION OF MAJOR VARIABLES PREDICTIVE OF POSITIVE CHANGE IN CAUSAL THINKING

	Variables	Beta	t-value	Probability*
2.	Initial Level: Causal Thinking	0.523	5.87	$<.01$
12.	I.Q.	0.188	2.12	$<.05$

*Population value of beta is zero (two-tailed); N = 94.

CHAPTER IV

DISCUSSION

Causal Thinking and Personality

The initial analysis was oriented, first, toward determining the relationship between causal thinking and certain personality variables recognized as enhancements of the personality and deterrents to maladjustment, secondly, toward providing a more complete and objective description of the causal thinker per se.

Table 3 (p. 35) indicates that a relationship (significant beyond the .01 level) does exist between causal thinking and several of these personality variables. This suggests that any program to enhance or to further develop causal thinking in elementary school children would also positively effect a larger segment of the personality structure. It also suggests that the enhancement of causal thinking should be the joint concern of the mental health worker and the educator.

The relation between personality and causal thinking holds up when one considers the regression equation (Table 5, p. 38) which takes into account the overlap and redundancy among the variables present in any zero-order correlation. The primary four variables listed in Table 5, Social Adjustment, I.Q., Temperament and Attitude toward School, remained after the significance of some of the variables listed in Table 3 dropped out during the build-up of the equation in a

stepwise fashion. It can be assumed that the primary four contain much of what was being measured by the other variables, and, therefore, usurped the weight of these variables in the equation.

In support of these considerations, Table 6 (p. 39) points out clearly that there is a significant relationship between causal thinking and social adjustment when I.Q. is partialed out, suggesting that causal thinking identified as an intellectual variable involves factors other than I.Q. Furthermore, the absence of causal thinking lessens to a greater extent the relationship between the remaining two variables than did the removal of either Social Adjustment or I.Q. Only the relationship between I.Q. and Social Adjustment dropped below the .01 level of significance on the partialing out of the remaining third variable—in this case, causal thinking. This suggests that intelligence facilitates to a certain degree social adjustment, but that this facilitation is considerably enhanced by specific training in the appreciation of the multiple causality of behavior and in the ability to decipher out and to deal with such multiple factors—all of which is implied in causal thinking as a distinct and separate ability.

This is further supported by evidence that the upper socioeconomic group of children are significantly more causally oriented than children from the lower socioeconomic group (Table 4, p. 37). The former group has long been recognized as significantly higher in I.Q. and adjustment as compared to the lower socioeconomic group. However, the factors of significance are the levels of I.Q. and adjustment rather than the socioeconomic level per se. When two diverse socioeconomic groups are found to be fairly matched in mean

scores on both I.Q. and adjustment as were the two groups in this study (Tables 1, p. 20; 17, p. 50; 19, p. 52), they are not significantly different on the causal thinking variable (Table 11, p. 47).

Both Tables 3 and 5 give us further descriptive data regarding the causal thinking child. Table 3 lists four teacher-rating variables that are significantly related to causal thinking: Attitude toward Schoolwork (10) involves a 5-point scale ranging from 1-almost never attempts any schoolwork, to 5-is actively creative in schoolwork; Types of Associates (13) ranges from 1-either associates with those who are often in trouble or socially irresponsible, or isolates himself socially, to 5-associates with those who are highly responsible socially; Activities and Interests (17) ranges from 1-appears to have no interests or participates in no activities, to 5-has a creative interest in almost everything and is a leader or star in a variety of activities; Attitude toward School (18), ranges from 1-actively dislikes school, to 5-sees school as being invaluable and capitalizes on the opportunity school affords him.

The causal thinker, then, relative to his classmates, is seen through the eyes of his teacher as one with creative interest in many facets of his life including his present school experience from which he derives much benefit. This creative interest is accompanied by active social participation in many activities which he shares with others as highly responsible as himself.

Interestingly enough, the four teacher-ratings also offer confirmatory evidence from another point of reference with respect to the causal thinker's own self-report of social adjustment (Table 3, p. 35).

In the regression equation, furthermore (Table 5, p. 38), we have included a fifth teacher-rating: Temperament (variable 14). This variable was not significantly related to the criterion in the zero-order correlation matrix (0.09); nor was it significant at the first order (-0.15), although it was at this point that its sign changed. Once, however, both Social Adjustment (5) and I.Q. (26) were partialed out, the relationship rose to significance (-0.21; $p < .05$). In other words, Social Adjustment and I.Q. were serving as suppressor variables to the Temperament variable. The Temperament variable on which the teachers rated their pupils ranged from 1-unstable-excitable most of the time, to 5-meets stress constructively and creatively. Therefore, with the negative relationship between causal thinking and Temperament it can be interpreted that if Social Adjustment and I.Q. are held constant, the teacher will tend to see the causal thinker as more unstable than his classmates. The causal thinker is seen as a social deviant when the deviancy cannot be explained away in terms of I.Q. or adjustment. He is seen as a disruption in the established order, which is understandable if we define the causal thinker as one intent on plumbing a situation for the multiplicity of causes; not content with, and at times openly opposed to, generalizations, stereotypes, or time-worn formulas. We have a supportive parallel with the fourth variable: Attitude toward School where the teacher rates the causal thinker as significantly more creative than his peers in schoolwork.

Further refinement and specificity in our description of the causal thinker was obtained in the second correlation matrix

(Table 7, p. 40) and the multiple regression formula (Table 8, p. 43) generated with the sub-scales of the battery of tests and inventories. To facilitate description of the causal thinker described in terms of these new variables, we liste the test manual description of the four individual components which were most highly correlated with causal thinking.

6. Freedom from Behavioral Immaturity.—Free of unacceptable or socially disapproved behavior for chronological age and social maturity. Test items examine proneness to selfishness; rudeness; impatience; spitefulness; and a lack of consideration for others.

5. Adequate Outlook and Goals.—Possession of generally positive and constructive attitudes in developing personal long-range plans and goals. Test items sample willingness to uphold the moral value of society, such as respect for rights of others; sense of justice; adherence to the Golden Rule; and belief in equality of opportunity.

13. Sense of Personal Freedom.—An individual enjoys a sense of freedom when he is permitted to have a reasonable share in the determination of his conduct and in setting the general policies that shall govern his life.

11. Self-Reliance.—An individual may be said to be self-reliant when his overt actions indicate that he can do things independently of others, depend upon himself in various situations, and direct his own activities. The self-reliant behavior is also characteristically stable emotionally and responsible in his behavior.

Here we have a picture of the causal thinker as one who is attuned to the social needs of others and mindful of social mores and values, which mores and values, on the other hand, do not interfere with personal initiative and creativity—a balance of the inner- and outer-directedness.

This accumulation of descriptive evidence is supportive of the contentions that interest in causal thinking as an important personality

factor can justifiably be fostered among mental health workers and educators alike; that efforts can justifiably be made to develop programs and techniques to foster its development.

Of complementary concern in any such endeavor would be the parent-child relationship. Table 9 (p. 44) indicates that there is a significant negative relationship between poor parental understanding of the child and the adjustment of the child. This relationship, of course, has been accepted in clinical circles for years, as noted previously. The more attuned the parents are to their own children and the more aware of and the more responsive they are to their needs, the more positive will be the emotional growth and personal stability of their children.

In light of the discovered relationship between causal thinking and good adjustment (Table 3, p. 35), it appears to be of decided importance that one recognize that the parent-child relationship may well affect the child's receptivity to the behavioral science concepts. One might in part deal with this by initiating the child's exposure to behavioral science concepts at an early age when one could be more assured of a closer tie between parent and child.

At the same time, however, behavioral science itself may have some effect on the parent-child relationship. Occasional reports from the children and their parents revealed ever-increasing family discussions on the class material and increased awareness of and an understanding of family dynamics. A case in point was an incident that followed a class discussion on displacement and scapegoating in which were discussed at some length the many sources of frustration

and anger for parents outside the home, which often resulted in the parents displacing the anger on children within the home. The importance of being able to distinguish between oneself as a legitimate object of other's displeasure and oneself as a scapegoat was stressed and related to the development of one's self-concept. The next day, one little girl returned to school and reported somewhat excitedly to her fourth-grade homeroom teacher, that this experimenter was right. Her father had come home exceedingly angry the previous evening because he had missed his train, and promptly began to shout at and discipline her and her brother. But she reported to her teacher: "I didn't get upset because I knew why Daddy was angry."

Change in Causal Thinking and Personality

The second set of analyses was oriented toward assessing the presence of change in causal thinking and in the related personality variables as a result of exposure to and participation in a defined behavioral science class and toward evaluating the contribution of certain personality characteristics and social factors to the receptivity to and development of causal thinking.

Tables 10 (p. 44) and 12 (p. 48) indicate a significant change in the experimental group as opposed to the control group with respect to both causal thinking and democratic behavior. The change was not distinguished by socioeconomic level which means that both profited equally from the exposure. It suggests in part that with I.Q. and adjustment held fairly constant, social background has little bearing on development in causal thinking, as well as democratic behavior.

Although the level of significance is minimal with regard to the assessed change, and relative to the customarily accepted levels of significance in psychological studies, the assessed difference far exceeds chance and, therefore, deserves consideration. As with other experimental projects, the total effectiveness of the experimental behavioral science class in bringing about change in these two variables may not be fully estimated because of the possible limited sensitivity of the chosen instruments to assess the totality of change, and because of the short duration of the class itself.

Both variables are recognizably large in scope, not easily encompassed by single instruments. At the same time, a total of 20 classes with an entire week in between classes to minimize continuity and significant reinforcements is only a poor approximation of an average elementary class during the school year. The evidence is suggestive that with a refinement of instruments and a closer approximation to an average elementary school class, far more significant change could be effected.

Tables 14 and 16 (pp. 49 and 50), on the other hand, outline a significant interaction effect with respect to the critical thinking variable. One might well associate greater critical thinking in social and personal behavior with the higher socioeconomic group because of the emphasis on competition, professional growth and self-enhancement. There may well be greater compliance and satisfaction with the status quo, both personal and social, among the lower socioeconomic group. This contention is partly supported by the significant

negative correlation (-0.20) obtained between critical thinking and socioeconomic ranking (Table 2, p. 32).

The behavioral science class appears to have reversed this process by effecting a greater change in the lower socioeconomic group (Table 15, p. 49). Probably for the first time with any consistency, the children in the lower socioeconomic group were acquainted with the process of critical thinking with regard to personal and social behavior; encouraged and supported in its use. The novelty of it, as well as its awakened value, may have contributed to the children's increased utilization of and facility with critical thinking.

Tables 17-20 (pp. 50-54) indicate that the control group increased significantly greater in reported self-adjustment as measured by the Mental Health Analysis than did the experimental group. This reversal of the predicted direction of change could well be attributed to the interaction of two effects: one, the social desirability factor which may well have enhanced the control group's post-test scores after the children had the duration of the experiment before retesting to reflect on the test items and to think more in terms of what looked more acceptable, and two, the experimental process itself which was directed toward encouraging and demonstrating among the children the process of critical analysis, both with regard to self and to social interactions. This latter presumably minimized the social desirability phenomenon in the experimental group where the teacher was seen as encouraging and rewarding a more critical approach, and decreased the verbal impression of adjustment because the encouraged critical analysis was turned toward self and its interaction with its environment.

This picture is further enhanced by the minimal significance in the interacting effect with regard to the freedom from the mental health liabilities variable (Table 20). The interaction adjusted means (Table 22) indicate that the significant change is to be found in the high socioeconomic group on the experimental level and the low socioeconomic group on the control level. This tends to corroborate the results found involving the critical thinking variable (Tables 14-15, p. 49) where we noted the significant change also in the interaction—the lower socioeconomic group on the experimental level showing greater significant change along with the higher socioeconomic group on the control level. What is apparently crystalizing here is the effect of the experimental behavioral science class enhancing critical thinking primarily among the lower socioeconomic group. The increased ability in critical thinking, coupled with the lower socioeconomic group's less involvement in social desirability and the questions of competition, prestige and self-enhancement, enables it to turn the critical analysis more inward toward self and its relationship with others. The result is an apparent decreased emotional adjustment as measured by the self-reporting instruments.

This phenomenon may be analogous to the process of psychotherapy where in the initial involvment with the therapist, there is closer self-examination and a willingness to both examine and to accept one's liabilities before dealing with them. At this early stage, the client often appears worse until such time as the individual pathologies actually began to lessen. In the time available to the

experimental class, the children may have reached the point where they were at least casting a more critical view upon themselves and willing both to accept what limitations may have begun to appear and to admit to others that they exist.

Table 22 reveals no significant change in the discrepancy between self- and peer-perception of self. After the experimental class, however, test mean scores (Table 23, p. 54) do indicate movement in the predicted direction with greater change shown in the experimental group than the control group. The lack of significance may be partly attributable to the fact that the discrepancy variable, among all the variables, is the furthest removed from the causal thinking variable—the main focus of the experimental class (Table 2, p. 32) and also, to the normal growth in positive social relationships among the children in the individual classes that occurs through the daily interaction in the classroom and on the playground. This recognized effect may mask any specific effect of the experimental class or at least place a great demand on the experimental class and/or the measuring instruments. Both contentions could possibly be tested by selecting a more refined instrument or instruments to measure social relations and by utilizing a class of longer duration.

Of further import was the assessment of those factors contributing to the significant change in the criterion variable, causal thinking, i.e. those factors facilitating or enhancing the effect of the behavioral science class on the causal thinking ability of the children.

On the strength of the evidence it is recognized that though statistically significant, the experimental class change in causal thinking relative to the control class was minimal, and that there was a decided difference in the amount of change of each of the individual children.

Included among the variables significantly predictive of change in causal thinking (Table 25, p. 57) are to be noted measures of adjustment. When, however, one allows for the intercorrelation of these significant variables, change or facilitation of change in causal thinking may be attributed to two primary variables, the initial level of causal thinking and the I.Q. (Table 26, p. 58).

What we have in essence is a readiness concept. The measure of profit from a behavioral science class oriented toward development in causal thinking and the associated factors of adjustment (as defined by the results of this study) is primarily one's initial level of attainment with regard to these factors. This measure of profit will, in turn, be greater for each succeeding exposure because of the growth arising from each prior experience—analogous to a geometric progression.

This is the pattern for many subject areas in the present school curriculum. It is support for both an early and continual involvement of the child in an ongoing developing subject area, and presumably, no less true for behavioral science.

CHAPTER V

SUMMARY AND CONCLUSIONS

Introduction

The present study was designed to examine the possibility of utilizing a didactic or teaching approach to develop mental health in elementary school children. It was planned to test whether the direct teaching of a course in behavioral science would aid in developing in the children the cognitive element, causal thinking, and at the same time, certain personality variables recognized as enhancements of the personality and as deterrents to maladjustment. Further effort was made to ascertain whether certain social factors might influence the receptivity to and development of causal thinking in the elementary school children.

It was felt that the effect of the behavioral science course would be enhanced by the children's previous exposure to physical causality in other subject areas, and because of the very framework of behavioral science and its concepts which are patterned after the physical sciences, and thus causally oriented.

The choice of the specific personality variables to be investigated was dictated by certain theoretical considerations regarding causal thinking. To the extent that causal thinking is defined as an awareness of the dynamic complexity of human motivation and as an understanding of the interacting nature of personal and social forces,

it would include among other things a recognition of the fact that there are alternative ways of solving most social problems that necessitate, in turn, positive interaction with others which are characteristic of democratic behavior.

To the extent that an individual acquires a dynamic awareness of the complexity of human motivation and an understanding of the interacting nature of the multiple determinants of behavior, he acquires a flexibility in thinking which is characteristic of critical thinking.

To the extent that one acquires an increased insight into the dynamics of one's own behavior and a willingness and/or ability to understand the problems and behavior of others, he acquires an ability to perceive himself and others more accurately fostering a correspondence between self- and peer-perception of self.

Furthermore, at face value, causal thinking and its assumed relationship with democratic behavior, critical thinking and adequate reality testing may well be considered an indication of positive adjustment. To the extent a child appears to be more realistic in his evaluation of the world around him, more aware of hiw own limitations as well as his assets, and more willing to admit that he can learn from others, he would be expected to be psychologically healthy.

In addition, previous studies citing differential receptivity to causal thinking concepts on the part of elementary school children, and analyzing the dearth of positive influences toward causal thinking from the child's social milieu, led to the thought that familial

background and social environment have considerable bearing on the present functioning level of causal thinking as well as on the receptivity of the child to an exposure to causal thinking. Other considerations such as advanced education and more complex reading material would lead one to favor higher socioeconomic levels as more conducive to growth in causal thinking than lower socioeconomic levels.

In the light of these theoretical considerations, the following hypotheses were selected to be tested.

Hypothesis 1 is a statement of the predicted effect of the behavioral science course:

1. Exposure to and participation in a class in behavioral science will foster significant growth in causal thinking in fourth-grade school children.

Hypotheses 2 through 9 are statements of the predicted relationships between causal thinking and selected personality variables:

2. There is a significant and positive relationship between causal thinking and democratic behavior which is a composite of several secondary characteristics, each of which is in turn, significantly related to causal orientation.

3. Exposure to and participation in a behavioral science class will foster significant growth in democratic behavior among fourth grade children.

4. There is a significant and positive relationship between causal thinking and critical thinking.

5. Exposure to and participation in a behavioral science class will foster significant growth in critical thinking among fourth grade children.

6. There is a significant and positive relationship between causal thinking and the correspondence between self- and peer-perceptions of self among fourth grade children.

7. Exposure to and participation in a behavioral science class will foster significant correspondence between self- and peer-perceptions of self among fourth grade children.

8. There is a significant and positive relationship between causal thinking and mental health assets, and a significant and negative relationship between causal thinking and mental health liabilities.

9. Exposure to and participation in a behavioral science class will foster significant growth in mental health assets, and will minimize or correct significantly mental health liabilities among fourth grade children.

Hypotheses 10 and 11 are statements of the predicted relationships between causal thinking and certain social factors:

10. Fourth grade elementary school children from higher socioeconomic levels will be significantly more causally oriented than children from lower socioeconomic levels.

11. Fourth grade elementary school children from higher socioeconomic levels will show significantly greater increase in causal thinking than children from lower socioeconomic levels as a result of exposure to and participation in a behavioral science class.

Four groups of fourth grade elementary school children, an experimental and a control group from each of two schools, one of high and one of low socioeconomic level, in the Quincy, Massachusetts school system, were selected. Groups were matched as closely as possible with respect to intelligence, grade achievement and chronological age.

Prior to the initiation of the behavioral science class, the groups were involved in a series of measures to assess (1) the initial level of causal thinking, (2) the initial level of adjustment, (3) social relationships, (4) individual profiles of personality factors. The tests included three types of measures: ratings by teachers, self-reports and evaluations of and by peers. The parents of the children in the experimental groups were also involved in the testing of causal thinking.

The experimental groups participated in the behavioral science course conducted on the basis of one 50-minute class per week over a period of approximately five months (January 5, 1965 - June 7, 1965) corresponding to the second half of the regular school year. The class meetings totaling 20 in number, were conducted partly on a lecture basis including presentation of pertinent research studies, with the children contributing to lengthy group discussions and minor class experiments. The content of the classes included, among others, an appreciation of and an exposure to the varied sources of individual differences, an acquaintance with scientific methodology ordered toward the understanding of human behavior and a detailed investigation of several early stages of human development.

At the end of the term there was a readministration of the tests given earlier.

The data were analyzed with the assistance of the 7094 computer, utilizing two major programs, STEPWISE (a multiple regression technique to assess the intercorrelations among variables and their relationship with the criteria) and ANOVA (a modified analysis of covariance technique to assess the significance and the direction of group change).

Findings

Analysis of Pre-Treatment Measures

The following is a list of conclusions supporting four of the major hypotheses (2, 4, 8, 10) predicting a relationship between causal thinking, certain personality variables and social factors.

1. There is a significant and positive relationship between causal thinking and democratic behavior, including specific positive relationships with four of its five component secondary characteristics.

2. There is a significant and positive relationship between causal thinking and critical thinking.

3. There is a significant and positive relationship between causal thinking and mental health assets, and a significant and negative relationship between causal thinking and mental health liabilities.

4. Fourth grade elementary school children from higher socioeconomic levels are significantly more causally oriented than children from lower socioeconomic levels.

Listed below are additional conclusions from further analysis of the data relevant to a description of the causal thinking child.

5. Social adjustment, I.Q., positive teacher-rating on Attitude toward School and negative teacher-rating on Temperament are four "best" predictors of causal thinking.

6. There is some suggestive evidence that the line of causality between causal thinking and adjustment runs from the former to the latter.

7. Another "best" predictive equation for causal thinking includes the specific traits: Freedom from Behavioral Immaturity, Adequate Outlook and Goals, Sense of Personal Freedom, and Self-reliance.

8. There is a significant and negative relationship between the discrepancy of the parent-child scorings on causal thinking and the adjustment of the child.

In line with the descriptive intent of this analysis, the causal thinker, relative to his classmates, is seen through the eyes of his teacher as one with a creative interest in many facets of his life including his present school experience from which he derives maximum benefit. He, nonetheless, is seen as a social deviant when his deviancy cannot be explained away in terms of I.Q. and/or adjustment.

In the causal thinker's own self-description, he is one who is attuned to the social needs of others and mindful of social mores and values. These mores and values, on the other hand, do not interfere with personal initiative and creativity resulting in a balance of inner- and outer-directedness.

Analysis of Post-Treatment Measures

The following is a list of conclusions supporting three of the major hypotheses (1, 3, 5) predicting change in causal thinking and selected personality characteristics as a result of exposure to the behavioral science course.

9. Exposure to and participation in a class in behavioral science fosters significant growth in causal thinking in fourth-grade elementary school children.

10. Exposure to and participation in a behavioral science class will foster significant growth in democratic behavior among fourth-grade children.

11. Exposure to and participation in a behavioral science class will foster significant growth in critical thinking among fourth-grade children of lower socioeconomic level.

One additional conclusions isolates those factors contributing to change in causal thinking.

12. The initial level of causal thinking and the I.Q. are the two "best" predictors of change in causal thinking.

Lack of significant change in reported self-adjustment among the experimental group was attributed to the interaction of two effects: the social desirability factor, and the experimental process itself.

Lack of significant change in the discrepancy between self- and peer-perceptions of self among the experimental group was attributed

to the interaction of two effects, the lack of significant relationship between the discrepancy and causal thinking, and the average growth in positive social relationships from the daily interaction in the school milieu.

Future Considerations

Consideration of the present findings leads to the suggestion that programs to enhance or further develop causal thinking in elementary school children can positively affect a larger segment of the personality and that the enhancement of causal thinking can thus justifiably be the joint concern of mental health workers and educators alike.

Furthermore, the fact that children are not only eager to learn in this field of knowledge but are capable of grasping its concepts, and that the behavioral science course is a substantial effector of change in causal thinking suggest that behavioral science could have a legitimate place in the elementary school curriculum. In addition, the measure of profit from exposure to behavioral science would seem to suggest an early and continual involvement of the child in this subject area.

Further research will be enhanced by the careful search for additional instruments both to assess more finely the variables included in this study and to go beyond its limited scope to include the assessment of values and other related variables. Extension of the investigation to older and younger school age children should also be encouraged.

In the application of the principles supported in the present study to education, work needs to be directed toward the expansion of the curriculum in behavioral science and toward the assessment of the properly timed introduction and pacing of newer concepts in the planned ongoing curriculum through the elementary grades on into junior high school and high school. This will involve the expansion of individual lessons and the search for appropriate pedagogical tools with the assistance of both curriculum planners and experts trained in the specific subject areas included in behavioral science, viz. psychologists, sociologists and anthropologists. It will also involve the development of special programs for qualified students who wish to pursue a career in teaching the behavioral science in the elementary schools.

Those educators who are able to see the school's role as extending beyond the teaching of the three R's and those mental health workers who are able to see the clinic's role as extending beyond the treatment of pathology, should not find it difficult to justify this work.

APPENDIX A

STORIES AND ADVENTURE

I. There is a story of six boys in the junior high school in Sunnyside. These boys usually go around together. They are often in trouble. One time the boys got into trouble for tearing down a fence in somebody's yard. Another time they broke all the basement windows in one of the store buildings. Just a little while ago, they broke into an empty house and smashed the light bulbs and tore down the window shades.
What things do you think are important in explaining the behavior of these boys?

T. F. 1. The boys are probably all alike in most ways because they all do the same thing.

T. F. 2. A person wouldn't have to find out much about these boys to know why they do such things.

T. F. 3. I am sure there can be no excuse for the behavior of these boys.

T. F. 4. These boys are breaking things because they are mean.

II. Mary was a little pioneer girl who lived with her family in the woods. One day on her way home through the woods, she lost a sewing needle she was carrying. She began to look and look all along the path. Suddenly some Indians appeared. Mary became very frightened. The Indians asked if they could help. Mary said "Yes." Soon they found the needle. Mary thanked the Indians, and used the needle to mend a hold in a blanket one of the Indians was wearing.

T. F. 1. Mary was wrong. Strange people cannot be trusted.

T. F. 2. There was no reason for Mary to be frightened.

T. F. 3. Mary and the Indians are so different I don't see how they can be friends.

T. F. 4. The Indians only helped because they were afraid Mary might tell on them.

III. Joey the duck was adopted when he was very young by a big family of very friendly chickens. They were very good to him. They gave Joey their food to eat, and let him join in all the chicken games. One day Joey decided that he wanted to leave and went to tell Mother Chicken and her family. They were very surprised and hurt that he wanted to leave them after all they had done for him. The Chicken family became angry and told Joey never to come back again. They slammed the door leaving Joey outside holding his suitcase.

T. F. 1. I think Joey should be ashamed of himself for treating Mother Chicken and her family like that.

T. F. 2. I don't think Joey had any reason for wanting to leave his adopted family.

T. F. 3. It just shows that the more you do for people the less they appreciate it.

T. F. 4. Mother Chicken and her family had no way of finding out why Joey wanted to leave.

IV. Tom's father was a famous airplane pilot who flew all over the world. One day he let Tom join him and they flew across the ocean to Africa. It was very hot there. Tom met a boy his age who lived in Africa. His name was Moro and he was very different from Tom. He was very dark and wore very few clothes. His home was made of leaves and mud and stood on poles high above the ground. Moro spent most of his time hunting and fishing. Tom wished Moro was more like him so that they could have fun together.

T. F. 1. I guess Moro is different just because he likes to be different.

T. F. 2. Tom would never be able to understand Moro because Moro is too different from him.

T. F. 3. Tom is right. If Moro doesn't change, they could never have fun together.

T. F. 4. I don't see any good reason why Moro has to be so different.

V. Jane and Alice, who were ten years old, were sewing on the ear of a stuffed dog. They were sitting on the front porch of Jane's house. A little girl who lived next door came over and tried to touch the dog. Jane and Alice didn't trust the little girl. They told her to go away. The little girl left feeling very angry. Pretty soon she came back and hit Jane and Alice. When they began to chase the little girl, she said: "If you hit me I'll tell my mommie. You can't hit me. I'm younger than you."

T. F. 1. The little girl tried to touch the dog, and hit Jane and Alice just because she's mean.

T. F. 2. She was just being a pest like most little girls.

T. F. 3. There was nothing else Jane and Alice could have done but chase her away.

T. F. 4. If Jane and Alice had let her touch the dog, she still would have been mean to them.

VI. Four girls who were all special friends were playing jump-rope in front of old Mrs. Grady's house. They were having loads of fun laughing and seeing who could jump the longest. Suddenly Mrs. Grady came out of the house shouting and telling them to get away from her house. Then she went inside and called the parents of each of the girls on the phone. All the girls were scolded when they got home. Now the girls are secretly planning on how to get even with Mrs. Grady.

T. F. 1. I'm sure that old Mrs. Grady just doesn't like children.

T. F. 2. There can't be any reason for Mrs. Grady not letting the girls play.

T. F. 3. There really isn't anything else the girls can do but get even.

T. F. 4. Mrs. Grady is like most old people who always spoil children's fun.

VII. Bill and Larry were Army pilots. They flew everywhere together. This way they could protect each other from enemy planes. One day while they were high above the clouds, Larry's plane suddenly turned away and left Bill all alone. Soon Bill was attacked by enemy planes. Luckily Bill was able to get away and return safely to his base. But Bill was very angry with Larry for leaving him.

T. F. 1. Bill was right to be angry. Larry should not have left him.

T. F. 2. Larry probably left because he was afraid of the enemy.

T. F. 3. I am sure Larry had no reason for leaving Bill all alone.

T. F. 4. Bill shouldn't bother asking Larry why he left.

VIII. Willie the Chipmunk and Luke the Rabbit were the best of friends. They decided one day to visit Farmer Roy's garden to nibble on the carrots and lettuce. On the way they came to a stream where Mac the Beaver was busily building a dam. Willie and Luke asked if they might cross the stream on Mac's dam. "Certainly not!" cried Mac but Willie and Luke started across anyways. When Mac saw them go near his dam he began to splash water on them with his big tail. Into the water they both went. Willie and Luke never did get to Farmer Roy's garden and were they mad at Mac the Beaver!

T. F. 1. Mac is like all beavers. They just aren't friendly.

T. F. 2. I don't think Mac had any excuse for not letting Willie and Luke cross on his dam.

T. F. 3. Mac was just being mean and wanted to show that he was boss.

T. F. 4. I think Willie and Luke have a good idea why Mac wouldn't let them cross.

Which story did you like best?_____

Why did you like this story best?_____

_____

Which one of these story characters would you like to be?_ _____

Why?_____

APPENDIX B

Class 2—January 11, 1965

Both classes began with a quick review of the points of discussion at last week's class, viz. the definition of a behavioral scientist and three sciences which fall under his domain: anthropology, psychology and sociology. Interestingly enough both classes remembered anthropology and psychology but both failed to remember sociology, although a few youngsters from each class could give the meaning of the word.

Some difficulty was met in both classes with regard to the actual nature of the science of anthropology with a few grasping the fact that it dealt with the study of man but could not readily differentiate it from the other sciences. A little time was devoted to elaborating to some degree the nature of the science as one involving the study of man's development, culture and past history. It seemed apparent that the concept culture was not readily grasped and would require further elaboration. At the same time, an attempt was made to elicit from both classes the nature of the contribution to our present understanding and own behavior that anthropology makes. With a few initial associations of anthropology with museums and fossils, and prehistoric animals, the class moved into focusing on the past contribution to our present knowledge and to our comfort of living. The invention of the wheel was a case in point and this was used as a springboard to introduce the fact that the people of the past could well help us understand ourselves and others in the present due to the fact that they conceivably shared many of our own thoughts, ideas, wishes, etc. The wheel, for example, was illustrative of the past's desire to move more rapidly. So too, today, our need of sports cars,

airplanes, etc. is also illustrative of our own present desire to travel faster and further. This sharing of more intimate feelings was drawn out a little further in the afternoon session at Atherton Hough on the strength of one youngster's reference to the caveman's retreat in caves and huts. This was used to illustrate the caveman's need for safety and security, his underlying fears, etc. The youngster readily saw that these are ever present among us today.

To further draw out the contribution of the three basic sciences to our own self-understanding and to the understanding of others, we moved to a discussion of behavior and the causal complexity of behavior. This was illustrated by a simple example utilizing a pen, marble, toy block and a sponge. The marble was hit by the pen, sending it rolling along the table. Then the class was asked to explain the reason for the rolling of the marble. Both classes centered on the fact that the marble was round as a reason for the movement. The marble was then placed upon the flat surface of the table and I pointed out the fact that even though the marble was round, it was not rolling. The class replied that it had not been hit by the pen. Then the marble was placed upon a sponge and hit by the pen with little to no movement on the part of the marble.

Many of the youngsters were quick to point out that it did not roll because of the sponge. With this simple illustration, we moved into a somewhat lengthy discussion of the complexity of causes underlying behavior. This complexity being threefold: The thing or object itself, its surroundings, and the forces acting upon it. It was underlined time and time again that unless these three were adequately

grasped and understood, no behavior in and of itself could be adequately explained. An example of a Martian looking upon the simple rolling of the marble across the table through a telescope which would not allow him a view of an outside force or the surroundings highlighted the fact that we only end up guessing about the reasons for the observed behavior as long as we are not able to see and understand the other factors involved in the behavior.

We then moved into a very simple example of a behavior response of one of the children. The advent of last evening's snowfall and the possibility of school closure which did not occur prompted us to give an example of a youngster coming into school with a frown on her face. The reason for the frown was not readily apparent but if we investigated further, we would discover that this snowfall prompted the youngster's hope for school closure, and the morning announcement that school would be in session prompted the unhappy feeling which brought on the frown.

When we moved into discussing other reasons for the frown on the youngster's face, one child in the Wollaston group noted after we had raised the possibility that the death of a pet parakeet might have prompted the frown that maybe the parakeet had been dead a month but the memory of the pet parakeet made the girl unhappy. This immediately allowed us to expand the third category, viz. that of forces acting upon an object, into forces inside and outside the object. In contradistinction to the marble, the child was alive and that though the marble was hit, it could not respond to the one who struck it. This would not always be the case of a living thing such as a child, and so

it was emphasized that this additional distinction in the third category simply added to the complexity of understanding fully any observable behavior and increased the necessity for care and conscientious study. To strengthen the importance of the three sciences, we associated them with the four factors underlying observable behavior: psychology giving us knowledge of the object and the forces acting upon it or in it, while anthropology contributing to further understanding of the surroundings and sociology contributing to both the surroundings and the forces.

Thence we moved into the question of how the knowledge of these factors underlying behavior can be grasped or obtained. Three procedures were highlighted: (1) asking, (2) observation, (3) experimentation. With the young girl and her frown there was a simple question of asking her. It was noted, however, that this method should be utilized with caution because of the possibility of untruthfulness. At the same time, some people are not always willing to volunteer information for one reason or another. To determine whether or not a boy can jump higher than girls, it was pointed out that we could obtain this information by observation but not a simple observation of only one boy and one girl. Both classes seemed quick to grasp the fallacy of generalizing upon a small sample. However, they were not critical only on the basis of the size of the sample but also on the question of the representativeness of the sample. One boy in the Wollaston group, for example, noted that the girls chosen might have had more practice at jumping than the boys while one girl in the Atherton Hough group mentioned the fact that some might be stronger than others. This was encroaching upon the third category, viz. experimentation, into

which the class readily moved. The Wollaston group gave an interesting breakdown of this third category without prompting by highlighting the various steps: (1) guessing, (2) looking for clues, (3) puting them together, (4) figuring it out, which led directly into the experimentation. This brought us back to the need for adequate samples, comparable groups and sufficient observation. Again the question of the avoidance of generalization was emphasized by one of the youngsters in the Atherton Hough School. He was quick to point out that the findings would be only of this particular group of boys and girls in a particular neighborhood and that you would have to take samples from other neighborhoods and other corners of the world. This was developed by this teacher to highlight one important point that experimentation often gives us knowledge about a particular group or groups and that we should observe a great deal of caution in extending these results or findings to other groups. This again illustrated the need to have a much deeper grasp of other cultures and peoples involved in the study of anthropology for a more adequate grasp of human behavior.

Toward the close of the hour it was pointed out to both groups that they would be given little folders next week in which they could keep the notes that they would take during the various classes. At the same time, they were encouraged to think about some segment of behavior that they might like to study by one of three methods that we had discussed in the previous class, namely, experimentation, observation, or asking. The children seemed to be on the whole, quite eager about becoming involved in their own study.

At one point toward the closing part of the class, it appeared that the children's attention began to wane. This raised some question as to the proper length of the class. It is conceivable that a 50-minute to an hour period might be a little too long. This will be duly noted next week. It is also interesting to note that in the Atherton Hough group we used as an example of a topic for experimentation the question of who can jump higher—boys or girls. The distancesjumped by groups of boys and girls were added separately with the boy's column coming out higher. This immediately brought out whoops of joy from the boys in the class. This teacher conjectured that the boys were jubilant for having come out on top for one of the few times in a predominantly female population and that they had found an ally in this male teacher.

Class 10—March 15, 1965

In the early morning Wollaston class, the children immediately began to chorus the request for the story of the little boy and the chimpanzee which this teacher had promised to tell some time ago. This appeared to be an appropriate time for this story as an additional example of changes in behavior through growth and maturation and could be readily associated with the previous discussion on the experiment of crawling with two groups of children. The story of child and chimpanzee involves a psychologist who raised a female gorilla by the name of Gua and his son Donald for about ten months between Donald's age of eight months to eighteen months, with the chimpanzee being six and one-half months at the time of her adoption. The children thought the name Gua was very comical and the boys began to chide the girls over the fact that the chimpanzee was a girl. The children were asked what they thought happened while the two were being raised by the psychologist and his wife. Most of them agreed that the chimpanzee began to walk and crawl, eat and play much more readily and better than Donald. However, they were asked (at the end of the 18 months) what they thought might possibly happen. There was some confusion at this point. Some thought the chimpanzee died; most had difficulty in assessing this experience as similar to the experiment of the two groups of children, one having the practice of crawling and one not, but at the end of the practice period, the other group soon reached the level of the other because they had reached their maturational level, appropriate for their age. One child, however, came up with the correct answer and said that Donald

began to do things better than Gua. Then the children were asked why they thought this was happening at the 18-month period. Again there was a chorus of answers—some a little out of context, such as "Animals have instincts to crawl." Gradually the appropriate answers emerged from the discussion. Gua did things much earlier and quicker because (1)she was stronger in the beginning, (2) animals are much more independent at an earlier age, and (3) animals have a shorter life span and so need to grow up faster. This last answer was pointed out to the early morning class because it was not solicited from the group in their discussion. It was noted that animals have the shorter life span. Age 12 is ordinarily an old age for an animal. The children laughed at this.

Again we emphasized the fact that once the maturational level is reached, appropriate and more developed behavior is readily apparent. To reinforce this, we wondered if the children had any idea as to how we might set up an experiment, similar to the one with the two groups of children crawling, in which we could actually utilize an everyday occurrence without our acquiring elaborate laboratory setups. Where could we find in existence children who are subject to an inhibiting environment during the early part of their development whom we could observe and who at a certain period of time are released from this inhibitory environment and allowed to manifest a behavior which had not been previously practiced? The children began to chorus answers such as in orphanages and hospitals, while one youngster suggested children with cerebral palsy. We pointed out

to the youngsters that it was necessary for them to begin with a healthy population so as not to introduce contaminating factors. We then told the children about a group of Indians called the Hopi tribe out in the West. We told them how it was necessary for both mother and father to work out in the fields and that it was impossible for them to leave the children at home because of the lack of babysitters and the fear of wild animals. One child guessed correctly that the mother strapped the child to her back when she went out into the field. The children began to see that we had a perfect setting for an experiment in which the child on the cradle board was in a similar situation to the tadpole in the drugged water, namely, that the child was continuing to grow but was not able to exercise and practice crawling and standing. Then the children were asked exactly where they thought we might obtain the experimental group. One child suggested going out East for them and again we questioned stating that the experimental and the control group must always be matched as closely as possible except for the one independent variable manipulated. In this case the variable would be practice. The children easily saw this. Finally, one child suggested finding other Hopi children without mothers and this led us to the orphanages. Here the children would be growing. At the same time they would also be moving and practicing crawling and standing.

Our proposed experiment would be run for 12 months and at the end of this period, the children would be taken from the cradle board and made to try crawling and standing. The children were asked if

they thought the Hopi children would walk as well as those who had been practicing for the 12-month period. We counted hands: 23 children said "yes" and 3 said "no" in the early morning class. There was a comparable split in the afternoon class. The children, of course, cheered when the correct answer was given: "yes." At this point we attempted to solicit from the children appropriate conclusions that we could arrive at on the strength of the last class discussion about the tadpole and crawling experiment which had been reinforced by this discussion of the Hopi experiment.

The children responded with the following: (1) Growth helps learning. We discussed this a little more at length pointing out the possible harm that is often done when more is expected of the child than he is capable of at his maturational level. We illustrated this by the example of the rivalry of the neighbors on the block, competing with one another in regard to whose child would begin to walk earlier. The children readily saw that the mother of these children would possibly become very angry if the child was slower in walking. It was pointed out to the youngster that this is illustrative of the fallacy of many parents who utilized the so-called average age as the appropriate criterion for the appearance of a particular behavior. Although the children had not yet learned average in their class, the children, nonetheless, appeared to grasp the concept. We illustrated it by pointing out that eight months was considered the average age for standing with support. We showed the classes, however, that this number eight months, was derived from observing children standing at (and we wrote this on the board) 10, 9, 7, 6. We then added up the

number which totaled 32 and then we divided it by 4 and the answer came out eight. We showed the youngsters that in a group of four children, there was no child who began standing at eight months but that there were some children who stood at a much later time, namely 10 months or 9 months and there were some who stood earlier, namely 7 months or 6 months. No child grows at the same rate but that all the children have their own individual rate of growth.

Then we asked the children for another possible conclusion that could be derived. There was an immediate response, learning helps growth. We pointed out that learning can help growth. At the same time we went on to explain that certain types of learning or experience can be detrimental to growth. To illustrate this point, we told the youngsters a story of a little girl born and unwanted by her parents who was locked up in a darkened attic room for six years. During that period of time there was no contact with any living human being other than her mother who would simply come up about two times a day and bring her food, and then immediately leave. At the end of the six years, the girl was discovered in the attic room and police finally came and removed her. We then asked the youngsters what they thought this little girl looked like and how she might behave when she emerged from the darkened attic room. One child questioned "Could she talk?" Some of the children thought she could; others did not. We began listing on the board the children's responses, identifying them as guesses or hypotheses. Some thought she would be short. Some thought she couldn't see well; that she

couldn't walk; that she would be awfully frightened. We pointed out that there seemed to be some disagreement among the children especially with regard to talking. As an example, we suggested listing the causes of talking, then looking to see if these causes were present. Then possibly, we could determine whether or not she could talk. The children responded with many appropriate answers, (1) hearing—both being physically fit to hear and having the opportunity to hear human voices, (2) practice and encouragement. This we illustrated with the example of the average mother and father who bounces the baby on their knee smiling at the baby encouraging it to make its first sounds. With additional encouragement and practice, the child begins not only to hear other human voices but its own, and through trial and error and repetition, begins to gradually acquire a series of words. The children made an association with these causes and the child's experience in the darkened attic room and they readily saw that she had neither the opportunity to hear human voices nor the opportunity to practice and receive encouragement from others. It seemed very unlikely, then, that the child was able to talk when she emerged from the darkened attic room. We offered this as an example of a learning experience being detrimental to growth.

We then pointed out to the youngsters that the child was soon adopted by another family and after two years of loving care and attention, encouragement, proper food and practice, the little girl at the age of 8 years old was ostensibly a very normal eight-year-old child who was capable of functioning as such. The children in both classes were very caught up with this story of the little girl. Some

in the early morning class seemed to be extremely curious and quite sympathetic to the little child. They wanted to know why the parents locked the girl in the room. When it was suggested that the parents didn't love the little girl, they wanted to know why. They then wanted to know how the girl was finally brought out and who raised her. At the same time, however, one little garrulous girl in the early morning class was quite sure that there was a window in the attic room and that the door was often left open. If this were not so, she thought that the girl would not have had enough air to breath. At the same time she also thought that the mother would have talked to the girl when she brought the food to her so that with all this, the girl must be able to talk. She was quite convinced that I had not adequately told the story and she was not about to change her conviction even after I repeatedly pointed out to her that the story was correct as it was told. One boy in the early morning class also suggested that it must have been very difficult for the girl to see because the sunlight certainly must have hurt her eyes after six years of a darkened room.

Class 18—May 17, 1965

Today we began the class by asking the children how they had arrived at resolving the question raised at the previous class, namely, who is more afraid, boys or girls. Both classes, however, admitted they had forgotten the assignment and had not done much thinking about it. Therefore, we suggested that we use the class period to resolve the problem as good scientists would. First of all, how might we go about resolving the problem? Again there was the suggestion for observing or asking. We immediately pointed out to them that if we asked boys they would probably say that girls were more afraid and if we asked girls they would undoubtedly say that boys were more afriad. This we noted was an example of "bias." Therefore, at the suggestion of another member of the class, we decided to set up an experiment. How was this to be done? Someone suggested bringing in a dead bird to see who gets sick first looking at it. Another suggested brining in a snake. This latter choice brought into consideration the fact that obviously because of boys' and girls' varied experiences we would prejudice many because of their already acquired fear of some of these animals. Therefore, we should think in terms of an unfamiliar animal or better still, one that they were both afraid of. Again, there were a host of suggestions: a mouse, a large tortise, crabs, monkey dressed up as a blue faced baboon, baby gorilla, a pet alligator, a skunk. With regard to the latter, one boy suggested telling people that it wouldn't spray. This suggested the idea of possibly bringing in an animal that one would almost immediately

be afraid of and then actually have someone tell the children in the experiment that it was really tame. After they were told that the animal was tame, we would look to see who would pet it. It was suggested at this point, however, that this would immediately bring in the question of trust. How would one know whether the child went up to pet the animal afterwards simply because they trusted the individual who told them that it was tame or did not pet it because they were afraid or did not trust the person who had told them. Therefore, it would be necessary for us to obtain someone about whom there would be no question. In the early morning class, there was a host of suggestions as to whom they might get. Suggestions ranged from teacher, priest, ministers, and finally the happy solution, the President of the United States.

The early morning class finally settled on a tame lion about whom the youngsters would be reassured that it was tame by the President of the United States. The Atherton school class settled on a tame bear whose tameness would be assured simply by a stranger going up to pet it.

Other considerations were made at this time. It was asked how the experiment would be conducted. They mentioned groups of boys and girls and we immediately asked whether they thought all the boys and girls should stand around the cage while each of the boys and girls went up to touch the tame bear or lion. When some said "ues," they were asked whether or not this might raise some difficulties. The class soon saw that those children coming after would be less likely

to be afraid if they saw some going before them petting the animals. Therefore, it was decided that only one child at a time should enter the room with the fear. Then it was felt that some of the children would talk to those coming back and they might conceivably hear the other children scream at the sight of the animals. Therefore, it was suggested that each of the children would go in one at a time while the other children were enclosed in a room and then after each of the children went through the experiment, they would retire into another room by a separate door. This would eliminate all contact with the group yet to be tested.

The question of what this group of boys and girls would look like initiated a great deal of discussion. Some suggested taking a few boys and girls. We asked what problems would arise because of this restricted population. It was recognized that if we took just fourth graders, for example, we would not know about fifth or sixth graders. They might be entirely different. At the same time we needed many people in the group so that, as the children had discovered, we could be more that this is true of other people. At the same time, we have to be sure that none of the children had any experience with this kind of animal before. The children also suggested, independent of this teacher, that we should use children from different age groups. Someone suggested that we take 25 boys and 25 girls from each age group, namely 5 - 7, 8 - 10, 11 - 13, 15 - 17. The measure of fear would be the number of those who refused to pet the animal after being told it was tame. One boy in the afternoon class also made an

important point that was not brought up in the early morning class. He felt that one might need to change the bear in the middle of the experiment because the bear itself might change due to the large number of children who came up to it or because it had too much to eat after so many children offered it food. We thought that this was an excellent suggestion and recognized this as another possible bias in the experiment. Therefore, we agreed that it would be well for us to change the bear midway during the experiment.

For the sake of discussion, we put numbers on the board, seemingly quite arbitrarily, but the numbers were so placed on the board that overall there would be no significant differences between the number of boys and the number of girls who were afraid. However, the numbers were so chosen as to show that there was a significant difference in those who were afraid and those who were not afraid in the age variable. As the children grew older there was a significant decrease in the number of children who were afraid. We did this so as to illustrate to the youngsters the possibly different sources and information arising from one and the same experiment. In the beginning, there was noticeable discontent on the part of the girls in particular. They thought that this teacher was on the side of the boys and therefore, would make it turn out that the girls were more afraid of the animal than boys. There were loud cheers when the numbers turned out to show that neither boys nor girls were different from one another as far as fear of the animal was concerned. So this teacher remains in the good graces of the female population of the class.

This teacher is furthermore quite pleased with the development of the class insofar as it illustrated quite clearly that the children are gradually acquiring some sophistication with regard to scientific thinking and in particular with regard to some of the necessary considerations to be made in analyzing and interpreting human behavior. This also points out the necessity to think out and develop various projects that will elicit the participation and the ongoing discussion of the members of the class to insure maximum receptiveness to the theories and concepts at hand.

APPENDIX C

Class 8—March 1, 1965

As was promised prior to the school holiday, we brought in their first test. The announcement of the test was met with a variety of responses. None of the children, however, seemed overly upset and only a few admitted that they had not studied over the holidays in preparation for the tests. The test given was a short 12-answer immediate recall test. None of the questions were written out, but were simply repeated several times by this instructor as he walked about the room. The children were instructed to listen to the questions and to write the answers on their papers. Occasionally the blackboard was used to illustrate a particular point or to spell out a difficult word. The questions were as follows:

1. How many causes of behavior are there?

2. Behavior Science includes the three disciplines of

    (1) Psychology
    (2) Anthropology
    (3) (This was left blank for their answers)

In question 3, we spoke about the causes of behavior. These were listed on the board as:

    (1) The thing or object itself
    (2) The surroundings
    (3) (This was left blank for their answers)

In question 4, we spoke about the various means of examining behavior. These were also written on the board.

    (1) Asking
    (2) Observation
    (3) (This was left blank for their answers)

For question 5, we put on the board five groups of children distinquished by ages from 5 to 9. Under each of the groups we placed three

or four distances in feet with a gradual increase from the five year old group up to the nine year olds, and identified the feet as distances that children can swim under water. The children were then asked to decide what a diagram of that kind would tell us about the causes of behavior.

In the sixth question, we asked where a particular behavior that we might witness come from? We placed on the board first the word "heredity," second the word "maturation," and the third was left blank.

In the seventh question, we asked the youngsters how many pairs of chromosomes does man have? The second part of that question involved a definition of chromosome.

In the eighth question, we asked for a characteristic distinction among genes.

In question 9, we placed upon the board, first the word "mother" and then "father." Underneath "mother" we put a combination of genes, a large X and a little x and under "father" we put a combination of two little x's. We identified the large X as denoting brown eyes and the little x as denoting blue eyes. Underneath this we put together two combinations coming from the contribution of mother and father. One sibling was identified with a large X and a little x and the second sibling was identified with two little x's. We then asked the youngsters to identify the color of the eyes of those two siblings on the strength of the combination of genes that were put upon the board.

In the tenth question, we asked the youngsters to identify what is known as inherited behavior in animals.

For the eleventh question, we pointed out to the children that we had talked about three kinds of instinctive behavior in children,

namely, crying and sucking. The third was left blank for them to fill in.

The twelfth question we identified as a bonus question and asked the class if they could remember what the meaning of the word "hypothesis" was.

At the end of the test we allowed the children to exchange individual papers and to correct them as this teacher went about reading the questions and answers. Individuals in the class volunteered the answers. For question 1, the majority of the youngsters said there were three causes of behavior. This, unfortunately, was due to the failure of this instructor to point out to the youngsters that although this class was limiting itself to the discussion of three main causes of behavior, namely, heredity, maturation and learning. There were, however, many other causes of behavior. This was pointed out to the youngsters, although the answer "three" was accepted. It was noted in correcting the papers later on that one child had put down accurately, "many causes of behavior." The answer to the second question was "sociology" accompanying the words psychology and anthropology. The answer to the third question was "forces" accompanying the other two; the thing or object itself, and its surroundings. The answer to the fourth question was "experimentation." The answer to the fifth question was "the age was responsible for the ability to swim further underwater." The answer to the sixth question: Where does behavior come from? was "learning" which complemented the other two; namely, heredity and maturation. The answer to the first part of question 7 was "23 pairs or 46 chromosomes, and the definition of chromosome was "carrier." The answer to the eighth question

How many kinds of genes are there? was "strong and weak." With regard to the ninth question in which they were asked to identify the color of the eyes of the siblings, the first answer for the sibling with the combination of a large X and a small x was "brown" and the answer to the second, the sibling with the combination of two small x's, was "blue." The answer to the tenth question, in which we asked for the word that identified the inherited behavior in animals was "instinct." The third instinctive behavior in children along with crying and sucking was "grasping." The answer to the twelfth question, What is the meaning of the word hypothesis? was "guesses."

In examining the individual papers afterwards, it was noted that no one question was missed by all the members of the class. The ones that seemed to give the most difficulty, were question 4, "Ways to find causes of behavior." Here many of the children, instead of giving the word "experimentation" gave the word "guess" which we had illustrated as an antecedent to actual experimentation; question 10, "The word for the inherited behavior in animals, namely "instinct" was missed by a number of the youngsters. The actual meaning for the word "hypothesis" was missed by a considerable number of children. A common incorrect answer to the seventh question was the word "crawling." The children themselves seemed not to be overly upset with the test and spoke of the test as a great deal of fun. Many confessed they had not adequately studied and they thought now it would be wise to take better notes during the class and to be better prepared for the next test.

In the actual analysis of the data it is interesting to note that the mean score of the Wollaston and Atherton schools was identical,

namely, 8.6 out of a possible 15 right answers. This amounted to a total percentage of 57.3. In the Atherton Hough school, the mean for the boys and the girls were fairly comparable with the boys attaining a mean of 8.7 or 58 per cent and the girls a mean of 8.5 or a 56.6 per cent. In the Wollaston school, the discrepancy was much wider. The boys obtained a lower mean of 7.5 or 50 per cent and the girls a mean of 9.4 or a 69.3 per cent. In contrasting the two groups, the Atherton Hough School for both boys and girls and as a group did better than the boys in the Wollaston school but in the individual group, the girls in the Wollaston school did comparably better than the Atherton Hough School girls. However, with regard to the ranges of scores, the Wollaston school had a much larger group range from a low of 2 to a high of 14. In percentage, it would be a low percentage of 13.3 per cent to a high percentage of 93.3. The individual group ranges were a little shorter with the girls ranging from a low of 5 to a high of 14. In percentage it would be a low of 33.3 per cent to a high of 93.3 per cent. The boys' range was a little wider than that with a low of 2 to a high of 12. In percentage, it would be a low of 13.3 per cent to a high of 80 per cent. The Atherton Hough group range was much shorter than the group range of the Wollaston school with a low of 4 and a high of 13. Percentage wise, it was a low of 26.6 per cent and a high of 86.6 per cent. The girls' range in the Atherton Hough school was a little shorter than the one in the Wollaston school with a low of 5 and a high of 12. The percentage would be a low of 33.3 per cent which was comparable to the low score in the Wollaston school but only a high of 80 per cent which was 13.3 per cent lower than the highest score obtained by a girl in the Wollaston school.

The boys' range in the Atherton Hough school, however, was much shorter with the lowest boy's score that of 4 and the highest of 13. Percentage wise it would be a low of 26.6 per cent which was considerably higher than the lowest score of the boys in the Wollaston school and a high of 86.6 per cent which was 6.6 per cent higher than the highest boy's score in the Wollaston school.

In the light of the differences it was noted that two groups were fairly comparable with regard to the results of this first rapid recall test. It appears that with regard to at least the question of assimilation of concepts, the children as a group are responding quite acceptably and quite consistently with the difference in school systems having no immediate effect.

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BIOGRAPHICAL SKETCH

Bartolo John Spano was born June 11, 1934, at Cortland, New York. In June, 1952, he was graduated from St. Mary's High School. In June, 1956, he received the degree of Bachelor of Arts from Maryknoll College, Glen Ellyn, Illinois. From 1956 until 1960, Mr. Spano pursued theological studies at the Maryknoll Novitiate, Bedford, Massachusetts, and Maryknoll Major Seminary, Maryknoll, New York. In 1960, he did additional graduate work in Psychology at the University of Buffalo, and in June, 1961, received the degree of Master of Arts at the University of Illinois, Urbana, Illinois. In 1961, he enrolled in the Graduate School of the University of Florida. From February, 1962, until June, 1963, he served as Instructor in Psychology and Counselor at Western Kentucky State College, Bowling Green, Kentucky. During that interim he was elected President of the Warren County Mental Health Association. In September, 1963, Mr. Spano resumed his work at the University of Florida pursuant to the degree of Doctor of Philosophy. From September, 1964 until August, 1965, he worked as an intern in Clinical Psychology at the South Shore Mental Health Center, Quincy, Masszchusetts.

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This dissertation was prepared under the direction of the chairman of the candidate's supervisory committee and has been approved by all the members of that committee. It was submitted to the Dean of the College of Arts and Sciences and to the Graduate Council, and was approved as partial fulfillment of the requirements for the degree of Doctor of Philosophy.

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